

ELEMENTARY
VETERINARY LECTURES

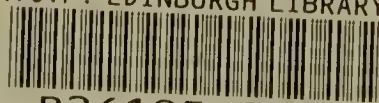


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ELEMENTARY LECTURES
ON
VETERINARY SCIENCE

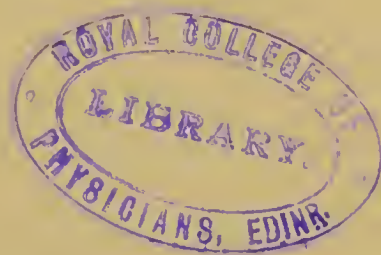
FOR
AGRICULTURAL STUDENTS,
FARMERS, AND STOCK KEEPERS,

BY
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WHITEHAVEN:
T. BRAKENRIDGE & CO., LIMITED.

1895.



“NEITHER THE NAKED HAND, NOR THE UNDER-
STANDING LEFT TO ITSELF, CAN DO MUCH; THE WORK
IS ACCOMPLISHED BY INSTRUMENTS AND HELPS, OF
WHICH THE NEED IS NOT LESS FOR THE UNDER-
STANDING THAN THE HAND.”

LORD BACON.

PREFACE.

THE idea of issuing, in book form, these Lectures—which were delivered at various centres, by instructions from the County Councils of Cumberland, Westmorland, and Lancashire—was first suggested by A. B. Dickson, Esq., J.P., Abbots Reading, near Ulverston, the Chairman of the meetings at Bouth. Shorthand notes of the lectures, taken at the time of delivery, form the basis of the book.

The work is of an elementary character, and the remarks on the various subjects brief, thus making it suitable for the use of students attending agricultural colleges, and for farmers and stock-keepers generally.

Although much adverse criticism has been advanced as to the wisdom of Veterinary Surgeons giving lectures and demonstrations, under County Councils, the author considers that it is a duty, not only to instruct the people as to the best modes of preventing disease, but also to caution and guard them against the use, amongst their stock, of advertised quack medicines, the composition of which they know nothing.

It is well known that persons are found who profess to know something about diseases and the action of medicines, and when an animal is found ailing, such individuals make an attempt to cure. Knowing, from experience, the often disastrous results from such treatment, the author has, as first aids for some of the maladies, recommended simple remedies, which, in practice, have been found beneficial.

Many of the ideas put forward are by no means generally accepted, notably the writer's opinion of germs and their action on the animal economy; he still holds that certain hygienic conditions and environments are required to render the body of the animal favourable to the entrance and subsequent development of these microbes.

To make the text more plain, especially in the case of Parturition, pen and ink illustrations (the work of amateurs) have been added.

H.T.

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ERRATA.

On Page 140, for *Thrombi* read Thrombosis, and afterwards in singular.

On Page 149, for *Hæmo* read Hæmo.

On Page 175, for *Strongylus Filaria* read *Strongylus Micrurus*.

On Page 205, for *Copora* read *Corpora*.

On Page 211, for *Strongylus Filaria* read *Filaria Papillosa*.

On Page 217, for *Equina* read *Equinæ*.

On Page 218, for *Ovina* read *Ovinæ*.



VETERINARY LECTURES

FOR

AGRICULTURAL STUDENTS.

FIRST LECTURE—INTRODUCTORY.

INFLAMMATION AND FEVER.

ALL the functions and actions of a living body are, more or less, due to a stimulus or irritant of a vital character, directly or indirectly applied; and from the peculiarity of the magnetism which surrounds our globe, I am inclined to think that

Electricity has more to do with life than is generally thought of.

The sun is said to be the light-giving element, the heat-giving element, and the life-giving element: without the power of the sun the vegetable world would cease to grow, and animal life could not exist.

From Electricity, we have both light and heat, and by its aid, motion and sensation can be restored to a paralysed limb; and, when the electric current is made too strong, life can be destroyed; therefore, I define **Life** as an Electro-Vital Phenomenon, peculiar to an organism, with the powers of absorption, assimilation, secretion, excretion, and reproduction; and **Death**, the cessation from all these functions, with the return of the organic structures to their ultimate elements.

Now all the different structures of the body are built up of small bodies called cells, varying in form according to the tissue in which they are found ; thus, the cells of bone are different from those of muscle (or flesh), being much in keeping with the mesh of a net, or a loop in a stocking.

A simple cell, whether vegetable or animal, has an innate power of a vital character, to multiply or reproduce, and by the multiplying of these cells, where circumstances are favourable, tissues and organs of different kinds are formed, and when all are in a normal condition, healthy functions are carried on.

Anatomy is a study of the various portions and structures of the body, and is both General and Descriptive. General Anatomy deals merely with the name and situation of the different organs and parts of the body. Descriptive Anatomy enters into a minute detail of their forms and structures, while

Physiology is a study of the functions, or of the work they perform in health. Thus, the function of the liver is to secrete bile; the kidneys, urine ; and the mammary glands, milk—all from the blood.

Pathology is the teaching of the derangements and diseases of these structures and functions. But, before we can undertake the treatment of the various afflictions which domestic animals are prone to, a knowledge of **Anatomy** and **Physiology** is necessary (but this will only be of a very brief and practical character), so that we may have some little idea of the part of the body alluded to when describing the different ailments.

For the sake of description, and to make my remarks better understood, I shall divide the subject into various sections, touching briefly upon the General Anatomy and Physiology of the different parts as I proceed, and, as there is nothing like a substantial foundation, I shall commence with the **Bones**, which are the basis of the animal.

ARRANGEMENT OF LECTURES.

2. **Bones**—Ligaments and Joints.
3. **Muscles (Flesh)**—Tendons.—(Sinews).
4. **Feet**—Hoof (Wall, Sole, and Frog), with Shoeing.
5. **Digestion (Horse)**—Mouth, Tongue, Gullet, Stomach, Intestines, &c.
6. **Digestion (Cow)**—Stomach, Intestines, Liver, Spleen, &c.
7. **Dentition** and Artificial Foods.
8. **Circulation**—Heart, Arteries, Capillaries, and Veins.
9. **Respiration**—Nose, Throat, Windpipe, Bronchial Tubes, and Lungs.
10. **Nerves**—Brain, Spinal Cord, Sympathetic Nerve, Eye, and Ear.
11. **Skin**—Hair Follicles, Sweat Glands.
12. **Urinary and Generative Organs**—Parturition.

When all these various structures are in a normal condition, the body may be said to be in a state of health, to maintain which, certain materials, called food, are necessary to replace the ever-changing of matter (more or less accelerated) going on, as there is not a thought or a movement of the body without some expenditure of tissue. This tissue must be renewed, and this is done by the process of **Nutrition**, which process belongs to all organised structures. Nutrition is upheld by means of food eaten, which, when digested, passes into the blood, and is carried by it to the various parts of the body. In the animal kingdom, before healthy nutrition can be successfully maintained, certain conditions are required, viz.:

- (1) The part to be nourished must be in a proper state.
- (2) The blood must be right, and not too far distant. (There are some structures, notice, into which the blood does not *go*; it only flows *near*; for instance, the cartilage covering the ends of bones in the formation of joints. In such cases nutrition is carried on by “imbibition,” or sucking up.)

- (3) The temperature or heat of the part must be normal. (If the part be too hot, inflammation may be commencing, while, on the other hand, everyone has read of a man's toes being frozen off, in the arctic regions, through extreme cold, thus showing the necessity of normal heat.)
- (4) All must be under the control or influence of the nervous system.

Circumstances are, however, constantly arising which interfere with the equilibrium of these functions, and then a perverted nutritive process is established, and disorder or disease is the result : hence health and disease are so intimately blended, like daylight and darkness, that we cannot tell when one ends and the other begins. This diseased action introduces a new study of the morbid structures, which is called **Pathology**, and here the microscope comes to our aid. In order that it can be better understood, various terms and classification are necessary.

1. **Pathology**—Is the study of disease.
2. **Etiology**—Shews the various causes of disease, exciting or predisposing.
3. **Symptomatology**—Gives the various symptoms, Negative and Positive. In some cases there are very definite symptoms, which indicate clearly the nature of an ailment ; in others the indications are few and lead to no definite conclusion. In such a case the physician resorts to the negative method : the absence of certain symptoms shows that the malady is not so-and-so. Thus he can exclude certain complaints from being the actual one, until the choice is brought down to a few possible diseases only.
4. **Prognosis**—Prediction of probable progress and result of the malady.
5. **Therapeutics**—The medical treatment, &c.
6. **Hygiene**—Diet, Sanitation, Clothing, &c.

7. **Epizootic**—Or Epidemic. When a disease is very prevalent, *e.g.*, Influenza, Pleuro-Pneumonia, and Foot and Mouth.
8. **Enzootic**—Diseases confined to certain districts. Red Water, Ague, Louping-ill, &c.
9. **Specific**—Arising from some specific germ or poison. Glanders, Pleuro-Pneumonia, Splenic Apoplexy.
10. **Sporadic**—Ordinary diseases daily arising. Simple Inflammation of the Bowels, Lungs, and Feet.

There are many other terms used in the medical profession, but the foregoing are quite sufficient for our purpose.

Before reviewing some of the injuries, derangements, and diseases of the different organs of the body, I shall refer briefly to that extensive, and most formidable malady, called

Inflammation, which is the most common disturbance affecting the organs of the animal creation: and yet, Inflammation, like fire or water, is a good servant as well as a bad master. It is both Reparative and Destructive. Without its aid, bones would not unite, nor would the surgeon's knife be of any service: the practitioner performs the operation, and trusts to Nature and Reparative Inflammation to accomplish the rest. Wounds, however simple, in horses and cattle, seldom, or never, heal without inflammation. If, however, the doctor cannot keep the inflammation under control, instead of reparative, destructive inflammation may set up. Therefore, inflammation may be defined to be an increased nutritive action in the first stage; secondly, perverted molecular change in the structures of a part, with heat, pain, redness, and swelling. I have seen the web of a frog's foot put under the microscope and noticed the change which took place. When a part is irritated, by sticking a pin in the web, the small blood vessels, called capillaries, first contract, then dilate—and this is said to be the first action of inflammation. If the irritation, or cause, be not removed, the fine muscular walls of the blood vessels become distended, and, finally, paralyzed, by the corpuscles crowding into the part and becoming adhesive—sticking together, as it were—

inducing further expansion and **Congestion**—just like people rushing out of a theatre on fire, all crowding in a narrow doorway. The fluid portions of the blood ooze through the sides of the vessels, which ultimately give way, the nerve filaments lose their tone, and the structure becomes changed and demoralised. That the minute structures play an important part in inflammation cannot be doubted, because the blood, before it reaches, and after it leaves, the inflamed portion, is the same as that in the uninflamed parts of the body. That contraction of the blood vessels is the first process after irritation is well exemplified by the cutting of the finger: blood does not flow for a moment or two, then relaxation takes place, and it comes freely.

The noted signs of inflammation are Heat, Pain, Redness, and Swelling.

Heat is caused by the large amount of blood sent to the part and increased chemical action going on. The heat is not, however, so great as is thought, for the temperature does not increase more than 4 or 5 degrees; and yet in an inflamed foot there is a perceptible increase of heat. We can, however, have heat without inflammation, as the body becomes heated from exercise or hard work.

Pain is owing to the irritation of the nerve fibres, from the pressure caused by the distension of the effused blood materials. Pain, however, varies in different portions of the body; it may be reflex and far distant from the affected part; in some places it is dull, as when the mucous membranes are inflamed; but when fibro-serous or serous membranes are affected, as in rheumatism and pleurisy, the pain is more acute and at times throbbing. Bone, in health, is almost non-sensitive, but when under inflammation, from its unyielding nature, the pain is excruciating. But we can have pain without inflammation; for instance, cramp or spasm.

Redness is due to the accumulation of blood, with a distension of the vessels and a crowding of red corpuscles in the part, and, finally, extravasation into the structures; yet we can have redness without Inflammation.

Swelling arises from many causes, but in inflammation it is occasioned by the congestion and exudation of serous portions of the blood, and extravasation of the blood itself, owing to the coats of the distended vessels giving way. Still, we have swelling in various parts of the body without inflammation; as in dropsy from debility, swelling of the legs from plugging of blood vessels or want of tone in the tissues, or the swellings of Blains or “Howkes” (nettle-rash) in cattle.

Yet, when all these signs are found combined—*i.e.*, Heat, Pain, Redness, and Swelling—they are characteristic of inflammation, and cause more or less constitutional disturbance in the body, with a certain amount of fever, according to the situation and nature of the attack.

Inflammation is of various kinds, such as Acute (sharp and quick), Sub-acute (not quite so active), and Chronic (of a slow character). Again, the temperament and condition of different animals influence the nature and degree of the inflammation. In strong, robust, and well-fed animals the attack may be of a **sthenic** or high order; whilst in those old, ill-fed, and weakly constituted subjects, the nature is likely to be of an **asthenic** or low character; thus showing how important the study of all these variations is to the trained practitioner, as they require entirely different modes of treatment. No one would think of treating a strong, robust, well-fed animal in the same way as he would a weak, debilitated one, although both may be suffering from the same complaint, and show the same temperature. Our great object and aim is to bring the inflammation to its most favourable termination with the least destruction of tissue or life. The terminations of inflammation are said to be—(1) Resolution, (2) Effusion and Adhesion, (3) Suppuration, (4) Ulceration, (5) Gangrene, or Mortification (death of a part).

Resolution: Our greatest endeavour should be to get the inflammatory action to this termination, as being the most satisfactory. If possible, find the cause and remove it, when the effect will cease and the inflamed structures will return to their normal condition; for instance, insert a pin into the hand; it causes pain, swelling, heat, and redness;

but if the pin or irritant be removed in time, and a suitable treatment applied (cold water cloths and protection from air), the parts resume their natural state—"a consummation devoutly to be wished"—this is called resolution.

Effusion, or oozing of the serum of the blood into the areolar tissue is another termination. For instance, a nip with a collar on a young horse's shoulder, forms large serous swellings or watery tumours, with small pellets and fibrinous strings floating amongst it; the same is seen on the front of a cow's knees, which at times become very large, due to bruises. In treating the knee, a good free opening should be made at the proper time, and dressed antiseptically, or a seton may be inserted; in the case of the horse's shoulder, the animal should, after the operation, be turned into a well-littered box or grazing pasture.

Adhesion is a termination of a reparative character, by the formation of lymph and the closing of wounds, but at times it is most formidable, particularly in *serous cavities*, such as the *pleura*, joints, and the sheaths of tendons.

Suppuration is perhaps the most common, and, most important, termination of inflammation. In large and extensive lacerations, if we fail to get resolution, our next endeavour must be to get the part to suppuration and the formation of healthy *pus* (matter which is of two parts, solid or corpuscles, and watery portion), to throw off the shattered and destroyed tissue. Suppuration can go on in different parts of the body, forming what are called abscesses (gatherings), as occur in strangles in young horses, which at first are hard and unyielding, but, as they ripen, or come forward, begin to soften and point in the middle, always aiming towards the external surface, with a well-defined marginal ring. Some burst of themselves, others require to be opened, but this should never be done unless the parts fluctuate well under the fingers, and in such cases the opening should always be at the bottom. We also have superficial suppuration, as in mucous surfaces, such as the bronchial tubes, nostrils, and generative organs. There are various kinds of *pus*, viz.:—(1) Laudable, (2) Putrid, (3) Sanious, (4) Scrofulous, (5) Specific.

Of these different kinds of matter—or *pus*—**Laudable** is looked upon as the most healthy. **Specific** resembles it in colour and thickness, but is most dangerous, as in the case of glanders. The others have their peculiar characters, and need the eye and attention of the professional man to deal with them.

Ulceration is another termination of inflammation generally found in parts of low organisation, or those wanting in vitality, where there is excess of absorption over deposition. The best example I can name is the front of the shin bone of the human subject. When a man or woman, over 60 years of age, injures the front of the shin, ulceration sets in, and this part seldom, or never, gets better—there seems to be a dissolution, or death of the minute structures, which nature has not tone to reproduce.

Ulcers generally have a hard unyielding base. There are various kinds of ulcers, but they are rarely seen in horses or cattle. The best mode of treatment is to apply stimulating remedies to the parts—a good fly blister—and generous diet. Ulceration heals by granulation, when small red pimples are seen in the bottom of the ulcer.

Gangrene or Mortification: When inflammation has been intense, or an extensive injury done to any portion of the body, more particularly the thick muscular part of the hips and quarters—being torn and lacerated by some foreign body, such as a cart or gig shaft—the neighbouring tissues are so much damaged—blood vessels destroyed and nerve fibre shattered to atoms—that the part is very liable to die, *i.e.*, end in gangrene or mortification. The same thing occurs in mares and cows being bruised in difficult foaling or calving. Our object, and greatest endeavour, should be to give tone to the neighbouring parts, and assist them to throw off the damaged and shattered portions. The best treatment I have found is to plug or cover the external wound with antiseptic dressings so as to exclude the air (nothing better than half an ounce of carbolic acid with seven and a half ounces of olive oil), and have a continuous application of blankets, 6 or 8 ply thick, wrung out of cold water every four or five hours, until a fine, thick, yellowish-white matter is seen coming

from the wound. In my opinion the cold water application seems to extract, and keep in check, the excessive heat usually present; in fact, a sort of endosmotic and exosmotic current is set up—the cold from the wet blanket passing into the part of the body to which it is applied, the heat being extracted from the part to the blanket, which becomes hot—equalizing the temperature, giving tone to the undamaged structures, and producing a sloughing, or throwing off of the damaged or dead portions. Hot applications, to be of any good, must be continuous; they are generally badly performed, and, in my opinion, relax the tissues, and favour the process of gangrene. When the part dies, and is not thrown off by sloughing, the surrounding tissues swell, and have a bladdery-like sound, with a dirty brownish-green watery discharge from the wound; there are rigors and tremblings of the body; pulse small and quick; respiration hurried; cold, clammy patches of perspiration all over the body, with head hanging down. We may then rest assured that the case is hopeless, **Septicæmia** or blood-poisoning having set in. Owing to the extensive swelling, we are tempted to scarify the distended parts by plunging in the lancet, thus admitting the air and hurrying on that process we wished most to avoid, viz., mortification, or death of the part, and also of the patient as well. All the formidable effects of blood-poisoning can be induced by a very small punctured wound or scratch with a sharp instrument.

“What is the matter with your horse?” I sometimes ask a farmer. “Strong inflammation” he replies. “What is the matter with your cow?” I often ask another. “Strong inflammation.” Yes; but inflammation of what? That is the question; for inflammation may attack any portion of the body, and the causes are various, such as cold, or an injury to a part, &c. Whenever we have inflammation it is always accompanied, more or less, by general fever.

The treatment of inflammation is both local and constitutional. Local treatment is when we can apply remedies, directly, to the affected parts, as, in founder or inflammation of the feet, removing the shoes, and putting on cold water bran poultices. *Weed*, or inflammation

of the absorbents or lymphatic vessels of hind or fore leg, is another good case for local treatment, and no treatment is better than to put meadow hay bandages, saturated well with cold water, and wound round the affected limb. Abscess forming in any superficial part of the body is another illustration for local treatment, which may be by hot or cold applications or poultices, cooling lotions, salt and saltpetre dissolved in water, ice, sal ammoniac, vinegar and water, or stimulating liniments and blisters.

When we have great disturbances of the system, setting up what is known as **Symptomatic** or **Sympathetic Fever**, we have, in addition to the local, to adopt constitutional treatment as well. This, in country practice, generally takes the form of blood-letting, purgative medicines—as enumerated on p. 15—hypo-sulphite of soda, chlorate or nitrate of potash, tincture of aconite, &c., as the requirements of the case seem to indicate; putting the animal in a loose box, with plenty of fresh air, giving it cold water to drink, and a cooling diet, bandages and clothing—but I will go more into detail when considering inflammation affecting the different organs and parts of the body. Town practice, I may say, is quite different to that in the country. The heroic treatment carried on in the country would kill town horses, owing, it is supposed, to the air being so much more pure than in the town. For instance, 4 drs. of aloes would purge a town horse, whereas it would take 6 to 7 drs. to have the same effect on one in the country. The same thing holds good in pit horses, which have to be treated similarly to town horses. In all cases, whether horse or cow, it is of the greatest importance to have the bowels attended to, but greater care is needed with horses, as they cannot stand strong purgatives like cattle.

I have already said that where we have an injury done to any part of the body, we may have what is called **Sympathetic Fever** set up. We also have fever arising without obvious cause, which is called **Simple Fever**. This may be brought about through change of food, drinking cold water when the animal is heated, or

changing from field to stable, and is generally ushered in by a shivering fit, that is seldom seen; but, if observed, it is advisable to at once put on plenty of clothing and give a good stimulant, say from $\frac{1}{2}$ to 1 pint of whisky, with the same quantity of water, or a quart of hot ale, and 1 oz. ginger—when resolution may be brought about and the animal ail nothing further. But, as generally happens, the shivering fit has not been seen, the first thing to be noticed is the horse hanging its head, breathing heavily and hurriedly, with nostrils distended, eye bright, and temperature increased to from 104° to 106° (normal from 100° to 101°). Endeavour to find the cause and remove it; if this cannot be done treat the symptoms thus:—Place the animal in a roomy, well aired, loose box, clothe the body, bandage the legs, and give what medicinal agents may be considered most suitable to the case, nothing being better than from 10 to 20 ounces of linseed oil, 1 ounce spirits of nitre, and 10 drops of Fleming's tincture of aconite (given as a draught), with 1 ounce of saltpetre in a pail of water to drink. If not better, or relieved, in a few hours, get other advice. Sometimes when the pulse is very full and strong, and the eyelid injected and red, the taking of 4 to 6 quarts of blood from the neck may relieve the animal so much that no further treatment will be needed (this I have seen in scores of cases), except giving nitre water and soft cooling food for a few days; but the bleeding should only be done by a Veterinary Surgeon. The advantage of bloodletting is, that it relieves the overloaded system quickly. To depend upon purgatives, either in horses, or cattle, would be loss of time, because it takes 24 hours in the horse, and frequently longer in cattle, to act on the bowels, while it is very difficult to unload the system by perspiration; therefore, early bloodletting, in many cases, is advantageous.

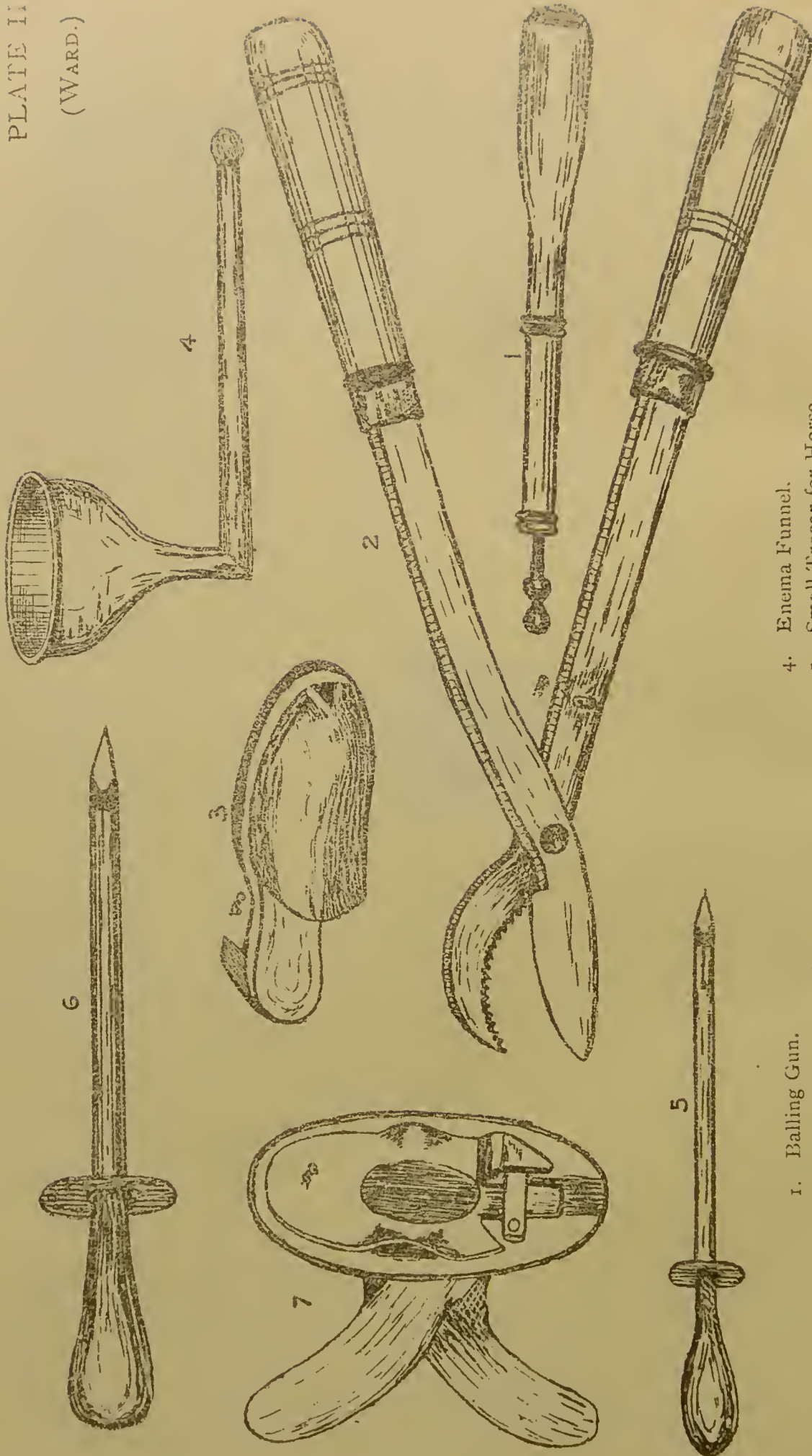
Bleeding in the past was *abused*: in the present, as a remedy, it needs to be *judiciously used*.

Again, we have fever arising from specific causes, as Influenza, Pink Eye, Pyæmia, and Septicæmia or blood-poisoning, such cases are of a more formidable character, and should at once be put under the care of a qualified practitioner, as the treatment is quite different to that of simple fever, the former requiring antiseptic treatment, and nourishing diet to keep up the strength. Quinine in these cases stands well to the front, and may be given three or four times a day, with nourishing gruels, linseed jellies, green food, carrots, &c.; chlorate of potash and hydrochloric acid, hay tea, &c.

From these remarks it will be seen that from the various constitutions and diseases which are met with, and the great differences in their treatment, it is quite unsafe to start and tinker with them unless the nature of the complaint is thoroughly understood. My advice to all of you is this: In the first place, get a clinical thermometer, which can be had at from 3/6 to 10/- each; and, if you have an animal ailing, take its temperature, by passing the thermometer into the rectum; if it rises to 103° or 104° (normal temperature of horse, 100° to 101° ; cow, 101° to 102° ; sheep, 103° to 104°), you should lose no time in calling in a qualified practitioner; as the case may be looked upon as tending to be serious. Don't think, because your neighbour, Tom Smith, or Bill Jones, had a horse or cow in just the same complaint—*apparently*—last week, and some wonderful patent nostrum cured it, that yours will be set all right with the same treatment. Bill Jones' horse may have had *one* or *two* of the symptoms similar to those exhibited by your animal, but yours may have others, accompanying these, which can only be detected by the professional eye. Don't waste time, money, and, perhaps, the animal as well, by delay in such a case, but send at once for a professional man, and, in the meantime, do as much to relieve the animal as possible, such as putting it in an airy box, clothing well, bandaging the legs, &c. This treatment will often, both in the case of horses and cattle, set them right, and the temperature will come down 2 or 3 degrees by

simply putting them alone in a loose box. Animals as a rule, when ailing anything in the fields, get away by themselves in a quiet corner. Follow example, I say then ; but whatever you do, don't start and tamper with quack medicines, of the composition of which you know nothing, and which may be exactly the reverse of what is required. Try and find out which way nature is working, and then do what you can to assist her. If you fail in this, send for your professional adviser.





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|--|-----------------------------|
| 1. Balling Gun. | 4. Enema Funnel. |
| 2. Hoof Shears—Cattle. | 5. Small Trocar for Horse. |
| 3. Clog for drenching Pigs (See Page 153). | 6. Large Trocar for Cattle. |
| | 7. Tracheotomy Tube. |

MEDICINES and DOSES.

HORSES.—As a purgative or laxative, **Linseed or Castor Oil** is by far the safest for amateurs to use. Dose: from $\frac{1}{2}$ pint to 2 pints.

ALOES.—These are of various kinds, and the best should always be used—but with very great caution—as a large number of valuable animals are yearly killed by their injudicious use. Horses should be well prepared with bran mashes for 12 or 18 hours previous to giving aloes, and during their action, which takes from 18 to 30 hours, tepid water should be given to drink. Dose: from 3 to 7 drams in ball or draught as occasion may require.

EPSOM SALTS are sometimes used with great benefit, in doses varying from 4 to 16 ounces.

STIMULATING DRENCH.—When cold, weak, and exhausted, from 1 pint to 1 quart hot ale, with sweet pepper and ginger, each 1 ounce; or $\frac{1}{2}$ to 1 pint whiskey and the same quantity of cold water, will answer for Horse or Cow.

CATTLE.—Purgatives and Laxatives. **LINSEED or CASTOR OIL** is generally used. Dose: from 1 pint to 2 pints.

EPSOM SALTS are most commonly given in doses varying from 10 to 20 ounces in gruel, with some warm cordial, such as ground ginger, sweet pepper, caraway seeds, gentian, from $\frac{1}{2}$ to 1 ounce each.

SHEEP.—**EPSOM SALTS**, from 2 to 6 ounces as a dose; **CASTOR or LINSEED OIL** from 2 to 8 ounces.

DOGS.—**CASTOR OIL** and **SYRUP of BUCKTHORN**, from $\frac{1}{2}$ to 2 ozs. each.

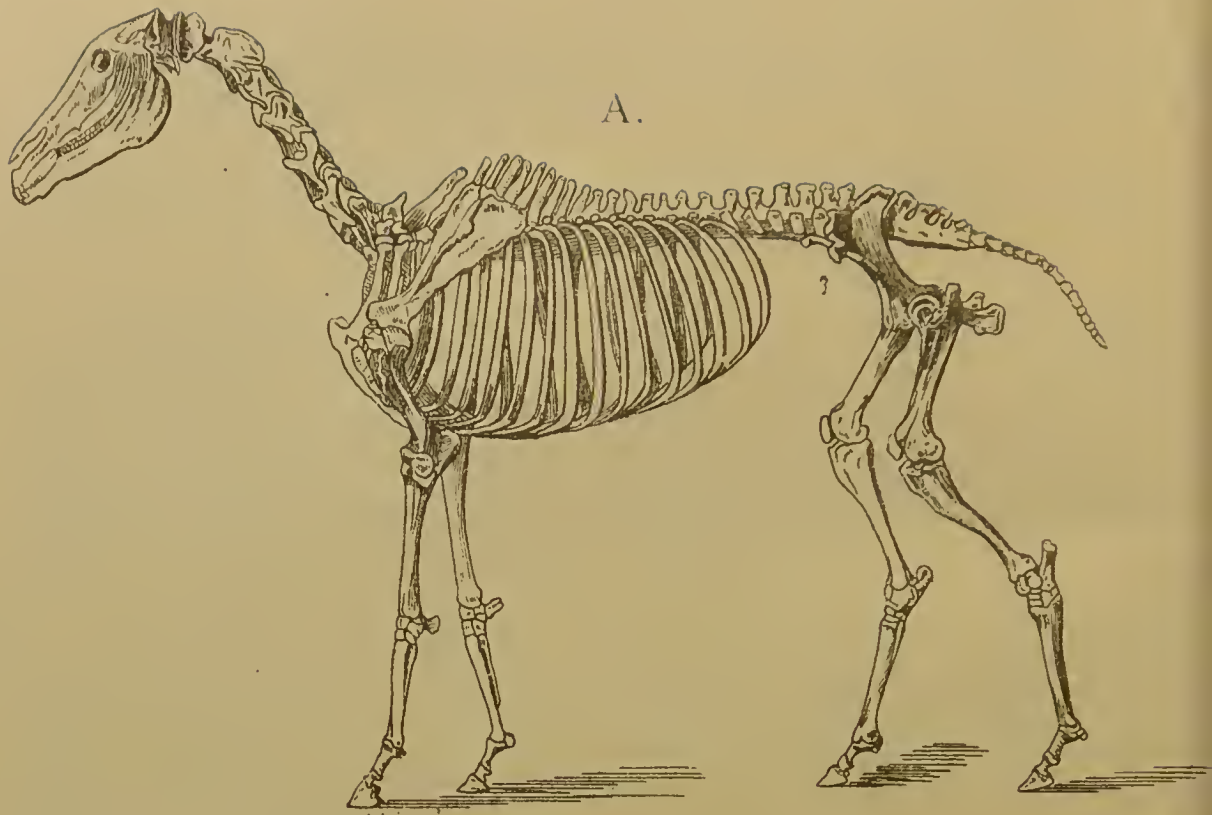
PIGS.—CROTON OIL, in doses from 5 drops to 20, is the best purgative; to be given in a little linseed oil or milk.

N.B.—Croton Oil should never be given to horses or cattle, yet it can be administered to pigs with safety.

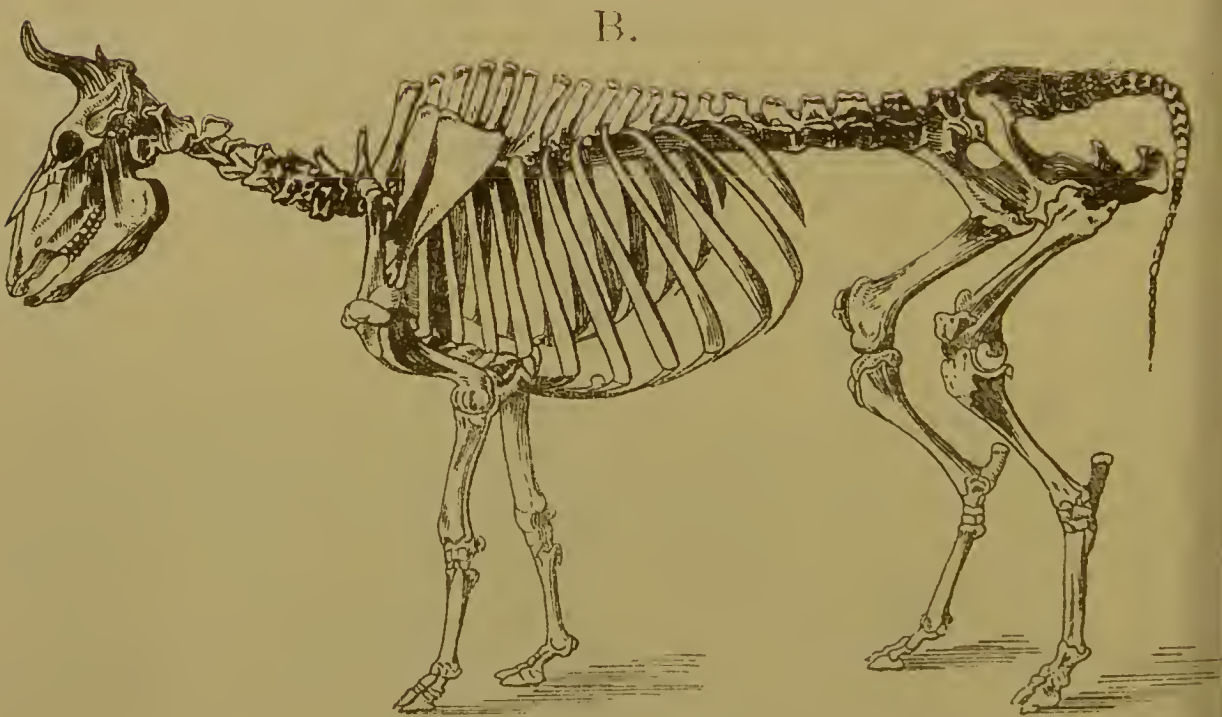
In drenching cattle, the old-fashioned horn—using the wide end—is much to be preferred to a bottle, or to using the small end of the horn. The latter method allows the fluid to trickle down too slowly; thus, it is apt to get the wrong way. But, by putting in a good hornful at once, as the former system allows of, the fluid is swallowed with ease, and there is less danger of choking.

Enemas, or Injections of warm water, are of great value in horses, foals, dogs, and pigs, but are of very little service in cattle. The derangements of the digestive organs in horses most frequently occur in the large intestines, while in cattle the stomachs are more generally disordered.





SKELETON OF HORSE.



SKELETON OF COW.

From BROWN'S *Animals of the Farm* (GRAINGER.)

SECOND LECTURE.

BONES.

OSTEOLGY means a study of Bones. Before entering into the details of the diseases and accidents peculiar to the bones of domestic animals, I will briefly run over the general skeleton.

First, what is Bone? It is a yellowish-white, hard, ordinarily insensible substance, made up of two structures, one of which is hard or compact, the other porous or cancellated; is composed of one-third animal and two-thirds earthly matter, and covered by a dense fibro-serous inelastic membrane called **periosteum**. It is the basis of the animal frame—giving attachment to the soft parts, and shielding the delicate organs. For description, bones are divided into **long, short or irregular, and flat**.

Long bones, or weight bearers, are found in the extremities or legs, and have a shaft and two ends. The compact or hard structure, exists on the outside, being **thickest** at the middle and inner side of the shaft, or wherever most weight falls, covering the cancellated or porous and light portions. This latter is most abundant at the ends of the bone, so as to give a large, yet light, surface for joints; and which is further covered by articular cartilage.

Short or Irregular bones are found in the back-bone or vertebral column, knee, hock, and lower portions of the limbs. These are principally composed of cancellated tissue, covered with a thin layer of the compact or hard structure, and are so arranged as to bear weight, yet allow of movement, more particularly of a gliding nature, and an open and shut motion.

Flat Bones are found where important organs have to be shielded. Thus, the bones of the head encase the brain; the shoulder-blade and ribs protect the heart and lungs, liver, &c.; while the hip or pelvic bones cover the organs of generation. Flat bones are made up of two layers of compact structures, with a layer of cancellated or porous tissue in the middle called the *deploë*.

				Horse.	Ox.	Dog.	Pig.
Vomer	...	...	...	1	1	1	1
Lower Jaw	...	...	...	1	1	1	1
Teeth	...	...	...	40	32	42	44
Os Hyoides	} bones of Tongue	7 sections	...	1	1	1	1

In the Pig, one single bone, Os Rostris, or snout bone.

BONES OF THE TRUNK.

				Horse.	Ox.	Dog.	Pig.
Cervical (Neck)	...	...	...	7	7	7	7
Dorsal (Back)	...	...	...	18	13	13	14
Lumbar (Loins)	...	...	...	6	6	7	7
Sacrum (Croup)	...	...	...	5	5	3	4
Coccyx (Tail)	...	...	...	13 to 18	20	20	18
Ribs	...	...	...	{ 8 true 8 true 9 true 7 true { 10 false 5 false 4 false 7 false			

The **Sternum**, or Breast Bone, is in seven sections, and in the horse is placed edgeway up, while that of the cow lies flat.

The **Sacrum** in the Horse and Ox is composed of 5 segments each; in the Dog, 3; and in the Pig, 4.

The Tail Bones are variable in different animals.

The Ribs of the Ox are straighter, broader, and more uniform than those of the horse; they expand at their lower end, and articulate with the cartilages of the Sternum with a true joint.

The Ox has also a small bone in the heart.

BONES OF THE EXTREMITIES.

Legs—Fore (Right and Left)—

				Horse.	Ox.	Dog.	Pig.
Scapula (Shoulder-blade)	...	...	...	2	2	2	2
Humerus	...	...	...	2	2	2	2
Radius (Fore-arm)	...	...	...	2	2	2	2
Ulna (Elbow)	{ Much larger in the Ox than the Horse }			2	2	2	2

		Horse.	Ox.	Dog.	Pig.
Carpus (Knee Bone)	...	8 pairs	6 pairs	7 pairs	8 pairs
Unciform, Pisiform,		}	Trapezoid and Pisiform wanting in the <i>Cow</i> .		
Scaphoid, Lunar,					
Cuneiform, Trapezum,					
Trapezoid, Os Magnum,					
Metacarpal	...	2 large	2 large		
,,	...	4 small	2 small		
Sesamoids...	...	4	8		
Suffraginis (Large Pastern)		2	4		
Coronæ (Small do.)		2	4		
Os Pedis (Coffin Bone)		2	4		
Naviculare (Shuttle do.)		2	4		

The arrangement of the bones under the knee of the dog resembles that of the human hand. They number 34 in each limb; whilst those under the knee of the pig are about 28 in each.

Legs—Hind (Right and Left)—

Os Innominatum, or pelvic bone, is composed of three sections, **Ilium**, **Ischium**, and **Pubis** (right and left), and forms the side, floor, and part of the roof of the pelvic cavity.

			Horse.		Ox.
Femur ('Thigh bone)	...	...	2	...	2
Patella (Stifle)	...	...	2	...	2
Tibia (Leg)	...	...	2	...	2
Fibula (Leg)	...	...	2	...	—
Tarsus (Hock)	...	...	6 pairs	...	5 pairs
Astragalus		}			
Os Calcis, Cuboid					
and three Cuneiform					
Large Metatarsal	...	...	2	...	2
Small ,,	...	...	4	...	2

The pastern bones correspond with those of the fore extremities, both in name and number. The bones above the hock are the same in the pig and dog ; the hock, however, consists of 7 pairs of bones in each animal ; while the bones under the hock are 29 pairs in each.

Having briefly run over the skeleton, naming and classifying the bones, their situation, structure, and use, I shall now refer to the study of joints and ligaments, or **Arthrology**.

Bones are held together by means of dense fibrous structures called

Ligaments, which are composed of yellow elastic and white fibrous tissue. One very large ligament, called **Ligamentum Nuchæ**, which supports the head and neck, is V shaped, and extends from the top of the shoulder, or withers, to the crown of the head ; its structure is of yellow fibrous tissue, and consists of two layers, or plates. The ligaments holding the ends of bones together, forming joints, are capsular and binding. The capsular are fibro-membraneous bags or sacks, which envelop both ends of the bones, and are lined by a fine serous membrane which secretes the **Synovia**, or **Joint Oil**, by which the articulation is lubricated.

The binding ligaments are flattened bands running from the lower end of one bone to the side and top of the succeeding bone and are called **lateral** ligaments ; but when between the ends of the bones in the joint they are called **interosseous**, and when they bind down tendons passing over the joints, are named **annular ligaments**.

Joints are of three classes, which, in descriptive anatomy, are again subdivided.

We will only deal with the primary three, viz. :

Synarthrosis—immovable—such as the union of bones in the head. **Amphiarthrosis**—slightly movable—as the vertebræ. **Diarthrosis**, most extensive and movable joints ; as in the hip, shoulder, knee, &c.

Cartilage is a pale bluish-white, firm, elastic, glistening substance, which forms the original basis of bone, and is called **Hyaline**.

We have different kinds of cartilage: **Fibro**, when it takes the place of bone in flexible places, such as the wind-pipe; **Articular**, when at the ends of bones to form joints; **Interarticular**, where it forms a pad in the middle of a joint, as in the vertebra and in the stifle. We also have the **Costal Cartilages** at the ends of false ribs; **Cariniform** cartilage, keel-shaped, at the front of sternum; and the **Ensiform** cartilage, heart-shaped, at the posterior end of sternum; cartilage of prolongation attached to the top of the scapula; **Lateral Cartilages** on each side of the foot; cartilages forming the basis of the ear and larynx. In short, cartilage is found giving shape and form where bone would not answer.

Now, the structures we have gone over are liable to disease and injury, as well as the soft parts of the body.

Bones are subject to inflammation, more particularly so in young animals, before they are matured. **Healthy bone** is **non-sensitive**, or very slightly so; but, when under inflammation, owing to its unyielding nature, the pain is very sharp. We have a very familiar example of this in toothache.

Inflammation of bone, or **Ostitis**, as it is called, may be due to injury, or may arise from constitutional causes, such as rheumatism, tubercular, or scrofulous disease. When the covering of the bone, or periosteum, becomes inflamed, it is called

Periostitis—this is very frequently seen in race horses, as **Sore Shins**. When the inflammation is continuous and extensive, soft bony matter is thrown out; sometimes a very slight injury may cause this bony deposit, such as **Splint** on the fore leg, or **Ringbone** or **Spavin**. When we have this deposit, it is called

Exostosis, and our endeavour should be to find out the exact place affected, and apply such remedies as will hurry on the inflammation to resolution, and thus form a true bony deposit; for treatment, nothing beats the application of cold water. When there is no water-main, such as is found in most towns, this can be accomplished by elevating a large cask or tub, filled with water, and connected with a piece of half-inch indiarubber piping, ten or twelve feet long, secured

to the horse's limb by a bandage or other appliance ; this, fastened to the part requiring irrigation, secures a constant stream of water on the syphon principle—**Tub and Tube Irrigation**—and when the inflammation has abated, a smart blister may be applied. Should these endeavours not meet with success—as abscesses rarely form in the bone itself—the disease terminates in

Caries or Ulceration of the bone (which assumes a worm-eaten appearance), or molecular death of some of the bony structure. There is no bone in the body that is not subject to this affliction ; but it affects some bones more commonly than others. The pain is continuous, and wears the animal down. The strength must be supported with good nutritious diet, while cold applications should, at first, be resorted to, followed by blisters, firing, punching, and, when practicable, cutting down on the part, and scraping with a bone spoon, thus endeavouring to bring about healthy action. These latter operations should be in the hands of a professional man. If the disease is near, or in connection with, a joint, our object should be to hasten on the inflammatory process to throw out sufficient bony matter to unite the ends of the bones, and form a stiff joint, this condition being called

Anchylosis.—In this case, the articular cartilage becomes absorbed or destroyed, and a bony deposit takes its place around the damaged joint, the two bones becoming joined. Sometimes the disease continues, and breaks out, forming **sinuses**, with a discharge of a fœtid, irritative matter, and is extremely difficult to deal with, requiring an operation and antiseptic treatment. Generous diet is highly necessary. Old horses are very subject to anchylosis—particularly in the back bones—from hard work or rheumatic affection. Great care is therefore necessary in casting these. The knee, hock, fetlock, and pastern joints also, on many occasions, become fixed ; the flexibility of the limb is interfered with, but slow work, particularly that on the farm, can be done without pain to the animal, although what may be called mechanical lameness may be present. When inflammation of bone is very intense, it may, at times, terminate in death of the affected part, and is called

Necrosis, resembling gangrene in the soft structures. The hard or compact structure is said to suffer most from Necrosis. I have seen it in the lower jaw, incited by the rough usage of the horse-breaker, where the dead portion, as soon as it became loose enough, was removed, and the part healed. I have removed half of the Navicular bone and wing of the coffin bone, also a portion of the shank—Metatarsal—with success; immediately the dead portion is removed, the discharge ceases, and the place soon heals up. It must be dressed with antiseptics, and interfered with as little as possible, in order to let it mend. At times the dead portion cannot be got at to remove, and then becomes sequesetered by healthy bony matter being thrown out, enveloping the dead portion; but this is a long process.

Occasionally we have inflammation of the Periosteum, and the part immediately below it, from injury, and small scales fleece off; this is called

Exfoliation; for which cold applications, rest, and good diet, with antiseptic dressing, are required.

Rickets.—This disease of the bone is mostly seen in young pigs and dogs, and not so frequently in calves and foals. There seems to be a want of earthy salts, or an excess of animal matter, so that the bones will not support the weight of the body.

TREATMENT.—Good oatmeal porridge, with plenty of milk and lime-water mixed should be given, and warm comfortable beds provided. Constitutional disturbance must be combated by the administration of cooling medicines, following up with tonics; and as such, nothing is better than the Syrup of Phosphate of Iron, Potash-Soda, and Lime, in half-ounce doses, three times a day, in water.

Associated with, and something analagous to, Rickets, we have another disease called

Mollities Ossium, or real softening of the bone, which becomes of a spongy red texture; the treatment is much the same as for Rickets. Another disease of the bone, which is thoroughly described by PROFESSOR WILLIAMS in his "PRINCIPLES AND PRACTICE OF VETERINARY SURGERY," is called

Osteo-Porosis, or a remarkable softening and swelling of the bony structure. This is a very peculiar complaint, from the description given by Professor Williams. I have not, however, in all my practice, come across such a case.

Fragilitas Ossium is mostly seen in an aged animal; as it advances in life the bones become firmer, and lose the animal matter to a certain extent, so much so that the bones of an old horse are more subject to fracture, owing to their fragile condition.

Osteo-Sarcoma, a peculiar disease of the bone and flesh as well, very common in fine bred cattle, mostly attacks the head and ribs; it creeps on very insidiously, producing little or no constitutional disturbance. At first, the animal seems to have no pain, but gradually loses flesh; yet I have seen cases where the whole side of the upper jaw, including the eye-socket and upper molar teeth, was so affected, that I have removed the latter with my fingers, and scraped off the diseased growth; and, although the bleeding was excessive, the animal seemed to feel no pain. The first appearance is a large swelling, which finally breaks out with a dirty brown discharge. I have seen the under jaw in a similar condition to that of the upper. As little or no good can be done, the animal had better be destroyed.

Affecting fine bred cattle, we have another disease which forms in the bone, called

Scrofulous or Tubercular disease of the bone. A number of cases have come under my notice where the tubercular deposit has been found in various parts of the spine, causing a peculiar staggering gait in the animal, which finally loses the power of the hind legs even when the tubercle has been found in the neck bones. It seems to follow certain strains of blood; the animal will continue to live on, feed, chew the cud, and finally get so bad that it cannot get up, and has to be rolled from side to side every five or six hours. I have tried all sorts of remedies, including slinging. The stifle and knee joints suffer very much from this disease, and treatment is of little use.

Enchondroma is a cartilaginous growth upon a bone, such as the sternum and ribs, seldom causing, however, any constitutional disturbance; when practicable, this has to be removed by a surgical operation.

Fractures—What is a fracture? Some define it as a solution of continuity—which, I think is not a good description. My definition of a fracture is—"A forcible separation of the cohesive particles of a hard substance into two or more parts." Now, the bones of an animal are as liable to fracture as those of the human subject; formerly it was thought that the bones of a horse would not mend; this is not so, they will unite more quickly than those of the human frame, but we cannot place the patient in the same state of rest and quietness—hence the difficulty in getting recoveries. In flat bones, as the shoulder-blade, and pelvic bones, where they are enveloped with flesh, the ends of the bones are kept fairly in apposition, and at times do capitally; by putting the animal on to the slings, with perfect quietness, and a good pitch charge applied over the affected parts. The bones of the pastern joints, also, sometimes heal readily, and where the animal is likely to be useful for stud purposes, it is worth the attempt. I have seen the best recoveries in the lower bones of the limbs, by putting on a good starch or plaster-of-Paris bandage—the latter preferable—and turning the patient out to grass. It is astonishing, when the animal is left to itself, how soon it can nurse the maimed limb. The long bones or weight carriers, such as the thigh, fore-arm, and shank, are most difficult to deal with—especially in the horse, which is generally destroyed; yet, in the human being they are the easiest. The long bones of cattle and dogs unite readily, by putting on thick shoe-sole leather splints, $1\frac{1}{2}$ inches broad with burgundy pitch melted, and all held with a bandage, not too tight, so as to allow of the swelling which takes place. When a bone is fractured we sometimes have much constitutional disturbance, or sympathetic fever set up, which has to be treated as well as the injured part. Before a fracture can unite, inflammation has to take place, and bony matter will be thrown out, called

The Callus, which in about six or eight weeks becomes solidified. If the animal has been on slings, it takes a great many weeks, after

this, before the muscles regain their action. Sometimes, instead of the ends of the bones uniting, they become covered with cartilage, and form what is termed a false joint; when this is the case it is best to have the animal destroyed.

Fractures are of four kinds, viz.:—

- | | | |
|-------------|--|------------------------|
| 1—Simple. | \| | 3—Compound Comminuted. |
| 2—Compound. | \| | 4—Complicated. |

Simple Fracture is when the bone is simply broken without much injury to the flesh.

Compound Fracture is where the bone has been broken in an oblique manner, and the sharp ends, pointing up and down, cut through the flesh and skin. In the horse, this is difficult to deal with; and the most humane course is to have the animal destroyed.

Compound Comminuted Fracture is where the bone is broken into a great many pieces, and the connecting tissues implicated; little or no good can be done in these cases.

Complicated Fractures are where the fracture extends into a joint, or wounds important organs, blood-vessels, &c.

Great care and judgment are required in putting splints and bandages on a broken limb. Splints made of stout shoe-sole leather are very useful, placed so as to leave room between the splints for the limb to swell, and for the passage of the blood. A little melted burgundy pitch put on the splint before placing it on the limb, keeps it in its place. The bandages, as they are rolled on, are smeared with the melted pitch, and must not be pulled too tight, especially in young foals.

Now all the bones of the body are subject to fractures. When we had the old horse thrashing machines, injuries to the bones of the head were not uncommon. In pit horses, too, I have seen the frontal and nasal bones delved in, and at times had to use the Trephine, to remove a piece of bone so as to get into the cavities and liberate the collected blood or effusion. The lower jaw sometimes gets broken, but such cases require the attention of the qualified practitioner.

The occipital bone is often fractured by the horse falling back, and so is the atlas. These injuries are generally followed by paralysis and the animal has to be destroyed.

The oblique processes of the Cervical Vertebrae (bones of the neck) are now and again fractured, mainly by the horse getting a hind foot shoe fixed in its collar on scratching its head. When this takes place the head turns round to one side, the nose nearly touching the knee, and has all the appearance of the neck being out of joint. See diagram in Professor Williams' "SURGERY." The head should be tied up short to the rack with a double shanked halter, and a stout pitch plaster, and wooden splints, with cradle, put on.

The bones of the neck occasionally get smashed by the horse falling on its head. One case in particular :—" Lord of the Harem," when racing at Harras Moor, Whitehaven, a few years ago, fell and broke the third and fourth neck bones. After falling, strange to say, *it got up and walked a quarter of a mile to a loose box* ; immediately it got inside, laid down, and never got up again. I saw it next day, in company with other two professional men, when we ordered it to be destroyed, as there was no mistake about its neck being broken. Greyhounds frequently come to grief in this fashion when coursing. When the back bone is broken, the animal can get on to its fore legs, but cannot get the hind ones up ; to test it, stick a pin into the hind limbs, and if it shows pain and can pull its legs up to its belly, or kick out, there is some chance for the patient.

The hip-bone, hook, or haunch, is frequently broken or chipped, and should be noticed particularly, in examination for soundness. It may be caused by the horse tumbling down, or by going through a door-way ; it does not hinder the horse from doing its work ; the piece broken off may drop into the flesh below, but very rarely brings on bad effects ; sometimes it forms an abscess ; then we have to cut down upon it and remove the piece or pieces of detached bone. This lesion is of more frequent occurrence in cattle.

When the shaft of the Ilium is broken, the horse has a peculiar way of walking ; on putting one hand on the haunch and the other on the rump bone, and getting someone to stir the leg, you will

both hear and feel the ends of the bones crunching underneath. Long rest and support with charges are required.

I have seen the floor (**Symphysis Pubis**) of the **Pelvic Bones** fractured at their junction by a fall down a stone quarry ; when the animal (a cow) attempted to stand, the legs spread apart. It was put on slings, had its hocks buckled together, and made a good recovery in about seven or eight weeks. When such an accident happens to a fat cow it should be sent to the butcher.

The Ischium, or rump bone, is sometimes fractured in the horse. This is caused by the animal falling over backwards, and occurs more particularly in a young horse, when first tied up, breaking its halter. It is not of much consequence, only the side injured is more flattened than the undamaged one. This should be carefully noticed in examination for soundness. It is best seen by viewing the animal sideway.

Cracked Tibia, &c.. in Horse.—The tibia, or leg-bone, on the inside of the hind leg, is apt to get cracked. Thus, if you have two horses in one stall, one of them, standing a little further forward than the other, may kick out and hit its companion on the inside of the thigh. The best that can be done is to at once tie up the injured horse with two halters, one on each side, and keep it so tied for ten days or a fortnight, not permitting it to lie down, as the limb frequently gives way when the animal gets up. If it gets over the latter period, it is likely to do all right. But if it is kept working for two or three days (which it may be equal to), the bone becomes inflamed at the crack, and the least exertion of the leg will cause it to break in two. Hence, if you are doubtful whether your horse's leg be cracked or not, give the animal the benefit of the doubt, and tie it up for a time. In the last case under my notice, the horse stood for three weeks, but, when turned out to grass, it laid down to roll, and, on rising, broke the leg in two. In the case of a blow on the inside of the fore leg—the Radius—there is the same danger.

The Shoulder Blade or Scapula may be broken by excessive muscular contraction, owing to the lower parts of the limb—particularly the foot—being suddenly injured. It may also be damaged by the animal falling, through making a sharp turn when galloping. If the fracture be oblique, and the horse is put on slings, the parts being well supported with a good pitch charge, a good recovery may result; but if the neck of the bone be broken and the joint implicated, treatment is of little avail.

The Humerus can be fractured by the animal falling in its gallop, or by a kick from another horse; recovery entirely depends on the nature of the injury. Treatment is the same as for the shoulder-blade.

The Elbow Point, or Olecranon, is occasionally fractured by a kick, or from falling. When this happens, the limb hangs down, and the knee joint bends forward as if all the muscles between the back of the shoulder-blade and the elbow point were torn asunder; recovery is very uncertain.

The Radius or Fore Arm, the Cannon or Shank Bones of the fore and hind legs, and the **Tibia or Leg Bone** of the hind leg in the horse are most subject to fractures, and are, as already stated, very difficult to treat, owing to the limb having to hang pendulous. The parts swell, generally ending with mortification of the soft structures and death of the patient. The most humane treatment is to destroy the animal at the outset. These bones in cattle, sheep, and dogs, however, generally do well.

The Knee Joint.—Some of the small bones of this joint are at times fractured by the animal being kicked, or by its coming in contact with a stone wall, &c. Splints and bandages should be applied, and long rest given, but the result is invariably a stiff joint.

The small bones below the **Fetlock Joint** are subject to fractures, generally caused by the horse galloping on a hard road, or rough uneven ground. **The Os Suffraginis**, or large pastern bone, in the fore legs, seems to be the most subject, being, at times, broken into a great number of pieces. Such cases may recover, but leave the patient with a stiff joint.

Sore Shins or Inflammation.—Inflammation of the cannon bones, and periosteum covering them, is a common occurrence in young race-horses, but is seldom seen in agricultural horses. The chief causes are hard work and hard ground.

TREATMENT.—Cold water applications, blistering, or tarring the legs, and turning out to grass or into a loose box for a period.

Ring-bone.—In this disease, as in splint, there is inflammation of the bony structure and deposition of bony matter. There are two forms, High and Low.

Low Ring-bone is seen just above the head of the hoof and is largest on the sides, while High Ring-bone is found a little higher up.

It occurs most frequently in light-legged horses and half-breds, more often in the hind pasterns than in the fore, and is accompanied by lameness, and, generally, by stiffness of the affected joint.

TREATMENT.—Give rest, and try to arrest the inflammation and bring about resolution, for which there is nothing better than a rope or bandage of meadow hay, rolled up nicely, and put round the leg—(but not too tightly)—keeping it constantly soaked with cold water until the inflammation is reduced. If this method fails, you must resort to blisters and firing, the hot prongs preferred.

Side Bones are found on each side of the top of the hoof in the fore feet, most frequently on the outside, and consist of ossification of the lateral cartilages, which are attached to the wings of the coffin-bone. This disease is most commonly met with in the cart horse, and, though there are often hereditary tendencies, is caused, in my opinion, by young horses being shod with high heels on their shoes, removing the frog from its work. Nature then, to provide the necessary support, converts the cartilage into bone. (This will be more fully discussed under “Shoeing”).

TREATMENT.—Cold water applications till the inflammation subsides, then blister, and fire with prickers.

Navicular Disease occurs in a little bone—shuttle bone—situated behind the coffin-bone, in the foot. (This, also, will be treated when dealing with the “Foot”).

Stifle Joint Diseases.—The joint, which corresponds to the knee of man, being a double joint, is, more particularly in an old horse, subject to extensive disease of the bone from hereditary and rheumatic causes, becoming **carious** (worm-eaten), the cartilage is absorbed, and a porcellaneous deposit takes place between the ends of the bones. An animal in this condition might work a long time at slow farm work.

TREATMENT is of very little use ; at the outset, rest and cold water applications, followed by blistering, firing, and setoning may have a beneficial effect.

Spavin.—Bone Spavin is a form of inflammation of the bone, in which a deposit of bony matter is thrown out. It is found at the lower and inner part of the front of the horse's hock, being inflammation of the inner head of the metatarsal or shank bone, at times causing great lameness. It is brought on by injury or over-exertion, as in jumping, more particularly in young horses when not trained or in condition. The pain, frequently, is so acute that the animal, when first brought out of the stable, dare scarcely put its foot to the ground, and, then, if it does, only on the toe, but after going a short distance, the lameness disappears, and the animal goes sound ; the lameness, however, returning again after a short rest. The toe of the shoe of a spavined horse is generally well worn. Bone spavins are not easily detected, more particularly when the joints are dissimilar, which is of frequent occurrence in half-bred horses : and causes great difference of opinion to occur amongst members of the profession—spavin or no spavin—more particularly so in cases of **occult spavins** when three or four small bones of the hock become united to such an extent that the original divisions are not distinguishable, there being little or no enlargement outside the bone. These cases are difficult to detect, as little or nothing can be seen or felt outside. A decision can only be arrived at by judging the movement of the joint, which, in these cases, is generally carried stiffly with a round-about action of the toe inwards.

In cases of doubt, press the front of the fetlock against the stifle joint for two or three minutes, then make the animal trot ; if it goes

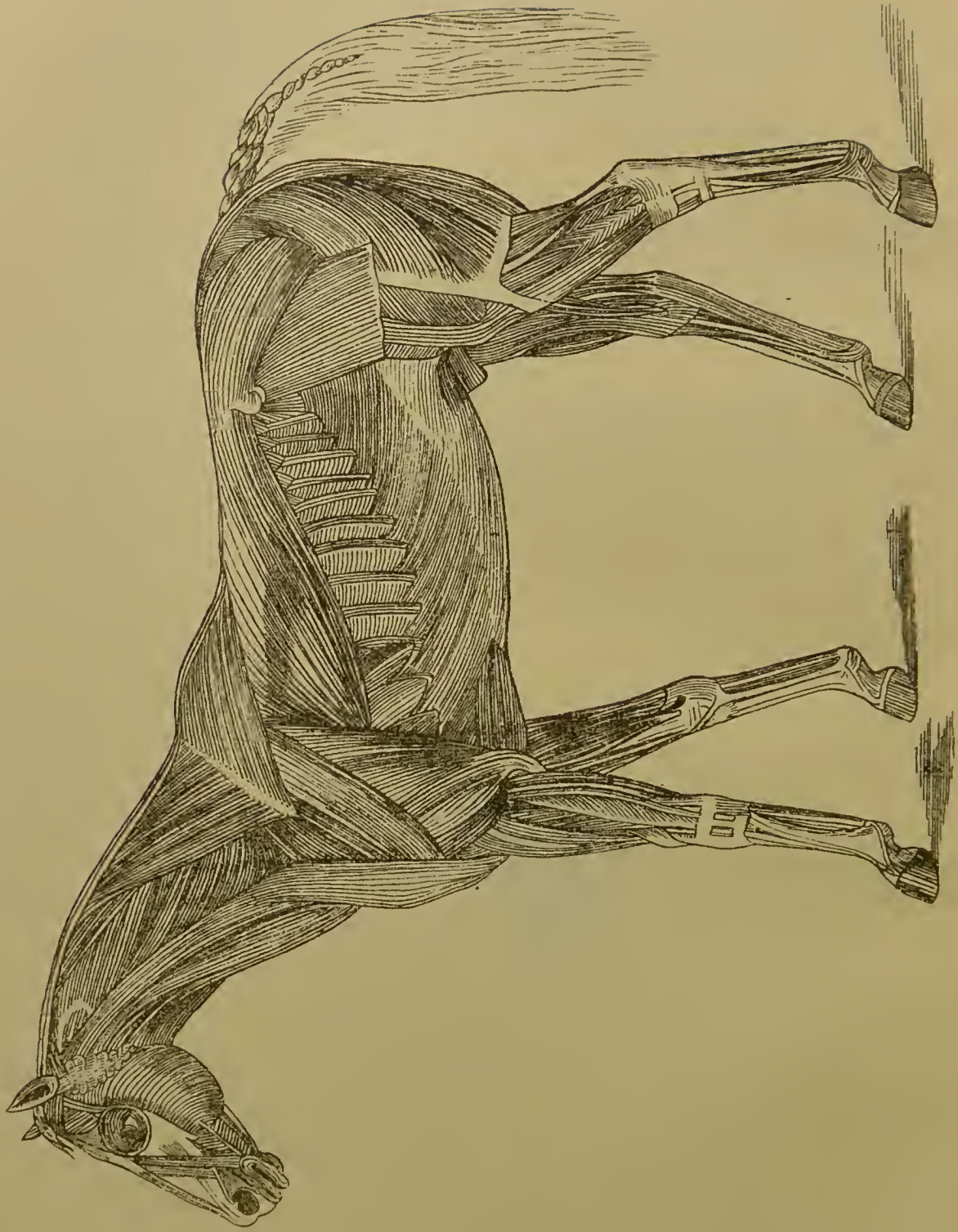
very lame and only puts the toe to the ground, you may be certain that spavin is developing.

When the inflammation is extensive it may terminate in **caries** or **ulceration**, when all the bones of the joint become involved; this as a rule may be looked upon as incurable, thus showing how necessary it is that *entire rest and careful treatment should be early adopted*.

THE TREATMENT is that laid down for splint and ring-bone ; but if there is one thing more than another that firing has a decided benefit for, it is Bone Spavin, as it hurries the inflammatory action forward to a healthy termination.

When we have any extensive accidents or disease of the bones and joints, the muscles surrounding, or above, the injury waste away, and take a long time before they resume their proper standard and tone.





EXTERNAL MUSCLES OF THE HORSE. From STRANGEWAYS, (GRAINGER.)

THIRD LECTURE.

MYOLOGY, OR THE MUSCULAR SYSTEM.

INTIMATELY connected with the bony structure, we have the muscular system, or the active organs of locomotion.

Muscle, Redflesh, or Beef, is a contractile, fibrous structure, and forms the bulk and symmetry of the body. It is composed of bundles of small fibres, held together by connective tissue. There are two kinds of Muscles—**Striped**, or **Voluntary**; and **Non-Striped**, or **Involuntary**. The voluntary are under the control of the will, such as those of the legs, &c. ; while the involuntary carry on the functions of the body, independently of the will, as in the coats of the intestines, uterus, bloodvessels, &c. The muscle of the heart, however, though involuntary, is striped.

A voluntary muscle may be said to consist of three parts:—1st, the origin—*i.e.*, where it arises; 2nd, the body, or fleshy part—the contractile portion, which does all the work; 3rd, the termination in the pale yellowish-white glistening bands, called **Tendons**, or **Sinews**, which are extremely strong, though very light. These latter are inserted into the various portions of the bony structure, which are to be acted on in locomotion.

Muscles, like bones, have peculiar names, according to their situation, attachment, and action. For instance, the uplifter of the upper lip, and wing of nostril—*levator labii superioris alaeque nasi*.

All muscles are more or less bound together by a fine membrane, called **Areolar or Cellular Tissue**—the most extensive structure in the body. The muscular system is well supplied with bloodvessels, nerves, and absorbents, it being to the operation of the nerves that the action of muscle is due. Muscle, in normal condition, is said to be chemically neutral, or slightly alkaline, but becomes acid on contracting.

Tendons are, as before mentioned, the terminations of muscles. They are most abundant in the lower parts of the extremities—shielding and protecting joints; at other times are spread out like a fine, strong, thin membrane, according to their situation and action. They are very strong and fibrous, slightly elastic, combining great strength, with lightness; their extreme strength being well illustrated by the every-day occurrence of slaughtered animals being suspended by their *tendones-Achillis*, or ham-strings.

Tendons are brought into action by the belly, or fleshy part of the muscle, contracting and relaxing.

To keep the muscles in proper order, good grooming and regular exercise are highly necessary—a profession in itself—as in training race-horses, &c.

Muscles and Tendons are subject to *Injury* and *Disease*, of various kinds:—

- Wounds**—1. **Incised**; clean cut, as with a sharp instrument.
 2. **Bruised**; caused by severe blows or falls.
 3. **Lacerated**; when the skin and flesh are torn by a blunt instrument, as a cart shaft.
 4. **Punctured**; probes with thorns, pitch-forks, &c.
 5. **Gunshot**; from shot, bullets, &c.
 6. **Poisoned**; from, say, arsenical sheep dip, wasp-stings, snake-bites, &c.

Of the foregoing, the only one that might heal by first intention, is the incised or clean-cut wound; yet even this is rarely seen in domestic animals. However simple the injury may be, it ought to have early care and attention; as it might take on “bad ways,” resulting in abscesses, tumours, sloughing, or mortification, with *Septicæmic* blood poisoning; or *Pyæmia*, when abscesses are formed in different parts of the body—well exemplified in bastard strangles.

Incised Wounds—Local Treatment. First examine the part, and stop the bleeding. If the blood be bright scarlet, and spurting out in jerks, an artery has been wounded. To arrest the bleeding, at once tie a cord, handkerchief, or bandage loosely around

the limb, above the wound; insert a pocket-knife or piece of stick beneath the cord or bandage, and twist it round and round tightly, until the bleeding stops, when the ends of the damaged vessel may be tied with a piece of silk, or even cotton, thread. Arteries are sometimes injured on one side only: this is very dangerous, and the bleeding is difficult to stop. In this case, the vessel has to be completely divided—which should only be done by a professional man—when the cut ends will contract into the neighbouring parts, and the bleeding cease. Blood from veins is dark red, and pours out of the wound in a continuous stream, turning brighter in colour as it runs down the leg or side, under the oxidizing action of the air. This bleeding may be stopped by applying the point of a red-hot poker to the vessel, or by placing a pad of tow over the place, and securing it with a bandage, where practicable. Plugging the wound with tow (which can be readily made by teasing out a piece of soft rope), is also of great service, and should be done thus:—First soak the tow well with carbolized oil, then plug it tightly into the bottom of the wound, securing it in the place by pulling the edges of the wound together with stitches of antiseptic silk, cord, catgut, or silver wire. In about thirty-six or forty-eight hours' time, the plug may be carefully removed, and the injured part re-dressed.

Carbolized Oil; Antiseptic Dressing:—Acid Carbolic (B. P.), $\frac{1}{2}$ -ounce; Olive Oil, $7\frac{1}{2}$ ounces. Mix. This may be used for wounds of all descriptions.

When the cut surface casts off fine thick yellowish-white, creamy pus, or matter, and the wound assumes a nice strawberry colour, it is a sign that healthy action has taken place, in the shape of granulation. Excessive granulations must be kept in check, by the application of some caustic lotion, or powder, of which there are many kinds.

To keep down undue inflammatory action, nothing is better than cold water bandages or cloths, kept constantly wet by pouring cold water over them from time to time. These should be continued until healthy matter is seen coming from the wound. (*See page 10 in first lecture.*)

After the edges of a clean-cut wound have been drawn together with stitches—sutures—I have frequently seen good results from covering the part with green (Stockholm) tar. This is a good disinfectant, and keeps the air from the wound ; it also has a tendency to keep the stitches from suppurating out, thus preventing the lips from gaping open. This is of most value in cases of injury to the neck, ribs, hips, and thighs.

Bruised and Contused Wounds may be considered as one, and are those in which the parts are injured with or without an abrasion of the skin—a good example being a black eye, in the human body.

In domestic animals, these wounds are generally caused by kicks, blows, goads from a cow's horn, slipping on ice, &c. The bleeding takes place under the skin, the blood coagulating and arresting the hemorrhage. Sometimes these injuries are very extensive, and should not be interfered with by an amateur, nor should they be cut into for eight or nine days, when a good opening must be made, and the clotted blood removed ; the wound may then be dressed with the antiseptic mixture and tow. Frequently they suppurate and form matter ; or the effusion becomes organised, and forms a big hard lump—tumour. A good example is the breaking of the “belly-rind,” by one cow “dumping” another ; or the kick of a brutal cattle-man or horse-man. In such cases, bandages round the body, to support the parts, are highly recommended.

Lacerated Wounds are caused by the animal coming in contact with some sharp body, such as barbed wire, when the skin, flesh, and tissue are torn in an irregular or jagged manner. Strange to say, we have little or no bleeding from this class of wounds. Their treatment is simple :—Dress with the carbolized oil, and draw the parts together with sutures ; then keep the inflammation in abeyance, by means of cold water applications, until healthy matter comes from the wound, which generally heals by granulation ; this, of course, must be kept in check.

Punctured Wounds. These, at all times, must be regarded as dangerous. They are produced by sharp-pointed articles, such as knives, pitchforks, stakes, thorns, &c. A minute examination should be made, as frequently a piece of wood, &c., is found, after many days, in the bottom of the wound. In all cases, the foreign body should be carefully removed, where practicable; but, in some cases, it is dangerous to remove it at first, and it has to be left in until it suppurates out of itself. When the bleeding is excessive, it must be stopped by plugging, and the part treated as described under Incised Wounds.

There is always a great danger of Blood-Poisoning setting in, especially if the thick part of a muscle be injured; and in no case should this description of wound be “tinkered” with. Punctures from thorns, in the hunting field, often cause a great deal of lameness, as well as constitutional disturbance, more particularly if in the knee, hock, or other joint; and if a piece of thorn has been broken in, under the skin, cold water bandages answer best, until the thorn suppurates out.

Gun-Shot Wounds.—These are mostly met with in time of war, but are frequently found in dogs. The bullets, or pellets, should be removed, if practicable, then dress as under Incised Wounds; but they may often be left in the part with safety, nature enveloping them with a covering of dense tissue, when they cause little inconvenience.

Poisoned Wounds are, happily, rare in horses and cattle, except when the skin has been damaged by lice, or by a scratch, and the animal has subsequently been washed with arsenical sheep dip. Animal poisonings are sometimes caused by wasp’s-sting, snake-bite, &c. For stings, apply a diluted solution of Ammonia. In bites from dogs, the best treatment is, to wash the part well with hot water, and apply Tincture of Iron.

From wounds of every description we may have a great deal of constitutional disturbance—Sympathetic Fever—when the temperature rises to 103° or 104° . This also must be attended to. (*See first lecture*).

Muscles occasionally become sprained, or slightly torn, without any swelling or lameness being visible, the animal merely going rather "stiff." All the muscles of the body—those of the neck, back, loins, quarters, &c., from slipping on the ice, falling, galloping, jumping, &c.—are liable to this; and to arrive at a proper conclusion, the history of what the animal had been doing previously, is indispensable.

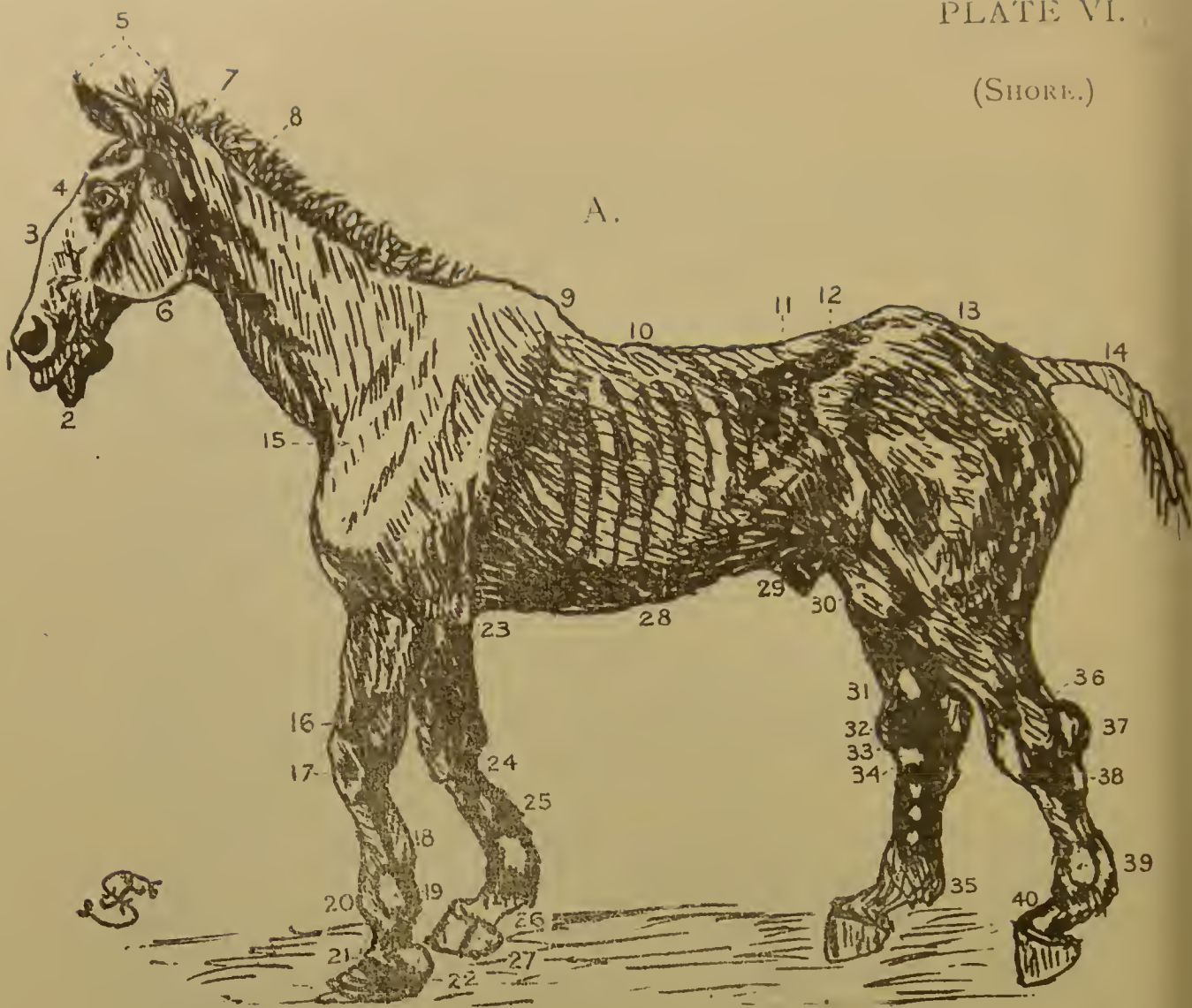
Frequently, nothing is seen until the flesh wastes away from the part; as for example, the so-called shoulder slip in young horses when first put to work.

If the animal does show lameness, rest, with cold water irrigation by means of the hosepipe, or tub and tube irrigation, several times a day, is necessary, while a run at grass is to be highly recommended; and, at times, blistering may be found expedient.

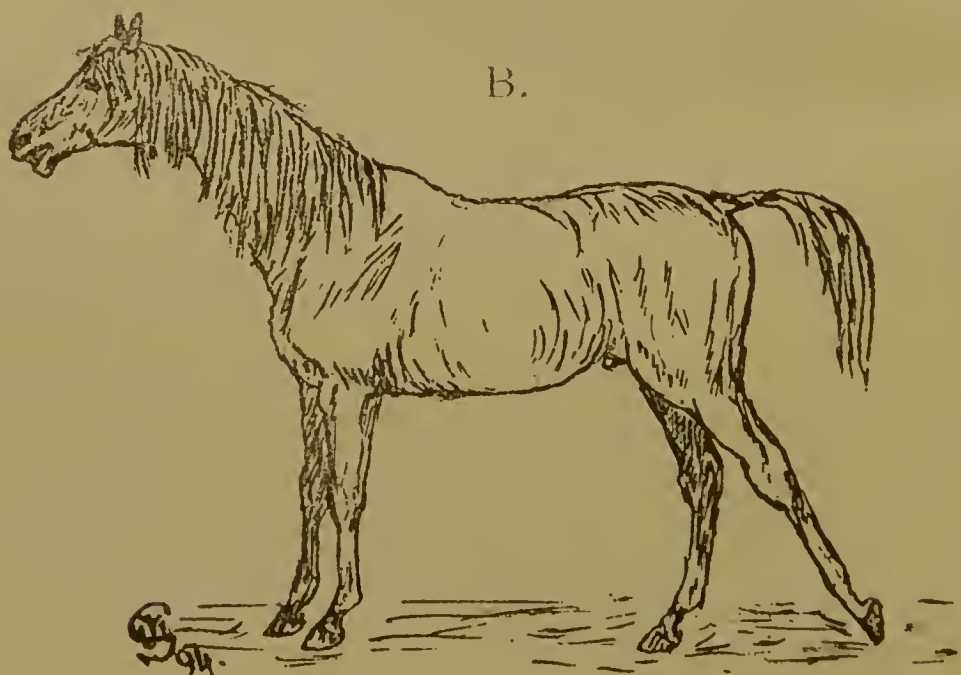
Lameness of the Shoulder may arise from many causes, such as injury to the shoulder point, or to the long muscle of the neck; disease of the liver, or even a slight disorder of the stomach, caused by a feed of new oats, Indian corn, or strange food of any kind, inducing indigestion. In all these cases, the symptoms of the lameness are much alike, the limb is carried stiffly, and swung in a round-about outward manner. To detect from what source it arises, the history of the case is necessary, accompanied by the eye and finger of the expert. It may be from any of those already enumerated, so that a careful and proper examination must be made before any treatment is adopted. If from injury, cold water irrigation daily, followed by blisters and long rest, should be resorted to; if from indigestion, or change of food, one ounce of carbonate of soda daily, for a few days, in the food, is very beneficial. Again, shoulder lameness may be due to

Rheumatism, which is said to accrue from some acidity of the blood. This disorder not only attacks the Periosteum, or covering of the bones, but the muscles as well. It is not so common in the horse as in the human subject, but, from long observation, I have met with it in certain breeds of horses, and have generally traced

(SHOREL.)



HORSE, SHOWING VARIOUS DEFORMITIES AND DISEASES.



DISLOCATION OF PATELLA, OR STIFLE.

EXPLANATION OF PLATE VI.

HORSE, SHOWING VARIOUS DEFORMITIES AND DISEASES.—A.

(SHORE.)

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|--------------------------------|---|
| 1. Nostrils. | 21. Foot Deformed from Laminitis |
| 2. Dropped Lip. | 22. Sidebone |
| 3. Roman Nose. | 23. Capped Elbow. |
| 4. Eye. | 24. Mallenders. |
| 5. Lop or Pig Ears. | 25. Seat of Splint and Speedy Cut. |
| 6. Submaxillary Glands. | 26. Cracked Heels. |
| 7. Poll Evil. | 27. Sandcrack at Quarter. |
| 8. Parotid Gland. | 28. Flat Ribbed |
| 9. Fistulous Withers. | 29. Tucked up Flank. |
| 10. Saddle Galls. | 30. Enlarged Stifle Joint. |
| 11. Loins. | 31. Bursal Enlargement |
| 12. Ragged Hooks. | 32. Bog Spavin. |
| 13. Mule or Goose Rumped. | 33. Sallenders. |
| 14. Rat Tailed. | 34. Bone Spavin. |
| 15. Shoulder Galls. | 35. Grease or Grapes. |
| 16. Knee Windgalls. | 36. Thoroughpin. |
| 17. Broken Knees. | 37. Capped Hock. |
| 18. Sprained Tendon. | 38. Curb. |
| 19. Windgalls | 39. Enlarged Fetlock. |
| 20. Knuckling Over at Fetlock. | 40. Knuckling Forward from Contracted Tendon. |

it to hereditary causes, and associated with heart affections. As in the human subject, its treatment is not very satisfactory. Alkalies are said to be best. Cattle, on some soils, suffer from a complaint of a rheumatic character, which goes by the name of "Cripples," or "Crockles"; this most frequently occurs on strong, undrained land, or sour mossy ground. The animal roaches its back and walks as if on stilts, it becomes hidebound, milk and flesh disappear rapidly, and the beast is very fond of chewing bones, stones, and foreign bodies. A change of pasture, with doses of 10 oz. linseed oil and 1 oz. turpentine, twice or thrice weekly, I have found to answer best. Dressing the land with lime or salt is to be highly recommended. In some farm buildings, young bulls, under 12 months old, are sometimes affected in similar manner, and I attribute it to the arrangement of the boxes, more particularly, the ground floor, which we frequently find laid with old red sandstone flags. In these cases I always recommend that the floor be pulled up, the soil dug to the depth of 8 or 10 inches, then filled with stones, bricks, sand, &c., and paved on the top with the old-fashioned blue cobble, or fluted stable bricks; or dry wooden beds, raised four to six inches, answer admirably. The animal ought to have the run of a large yard or paddock in dry weather, while half the quantity of oil and turpentine mentioned above should be given.

Kennel Cripple or Lameness in dogs is not now so common as formerly. It is, in my opinion, analogous to the foregoing complaint, and due to a similar cause. Sanitation, ventilation, and good dry wooden beds, raised 18 to 20 inches from the ground, are necessary, as well as a good ground floor. Change of quarters with doses of Salicylate of Soda are recommended for the treatment of this disorder.

Injuries.—*Poll Evil* is a very troublesome disease, and occurs just behind the ears. It is caused by an injury to this part, such as a blow from a big stick, wielded by a brutal stableman; through the horse—when in a low-ceilinged stable—throwing up its head, and striking itself against the beams; or, from a heavy, grandly furnished bridle. At first, the animal goes very stiff with its neck, and points its nose, with drooping head; it flinches when the collar or

bridle is put on : and swelling of the part is next noticed. As this is a very formidable disease to deal with, it should, at once, be put in the hands of a qualified man. At the first, cold water cloths ought to be constantly applied ; afterwards, blistering may be necessary ; and, finally, operation. As the part affected is of low vitality, great care and judicious treatment must be exercised, or the disease may extend to, and cause, caries of the bones. Poll Evil is fistulous in character, having a number of sore openings, and analogous to the complaint called

Fistulous Withers, which, as the name indicates, is a disease found at the top of the shoulders, due to some damage to the neighbouring parts, as from one horse biting another ; injuries to the bony spines by blows ; or nips from badly-fitting riding or harness saddles. Here, swelling is the first visible indication, when prompt attention is necessary. Cold water cloths should be applied, and kept constantly wet, and the saddles must be examined and altered. As already stated, it is a disease similar to Poll Evil, and should not be “ tinkered ” with, but must be immediately placed in the hands of a professional man.

The **Elbow Joint** is frequently injured from kicks and blows, as well as from the shoes being made too long, or with too much caulking, thus damaging the Elbow point when the animal lies down. If the shoe is the cause, it must be at once removed and remedied, to prevent further injuries from that source ; a stocking leg, stuffed with horse hair, should be placed round the pastern every night. Hot or cold fomentations ought to be applied to the damaged elbow, night and morning, with soothing absorbent lotions ; but beware of strong stimulating embrocations.

Broken Knees are of frequent occurrence, and vary greatly as to degree of injury. Some are slight, others extensive, while the joint may be damaged. The parts must be properly cleansed from all sand, grit, &c., then a pledget of tow, saturated in the carbolic dressing, should be applied, secured with cold water bandages, to be kept constantly wet, and not removed for three days, unless

the leg swells very much. The animal should have its head tied close up to the rack, so that it cannot lie down. If the joint be damaged, and joint oil run from the wound, a special tin splint must be placed at the back of the knee, to keep it steady. The cold water bandages keep the inflammatory process in check, conducing to healthy action, closing the wound by granulations, which may appear in eight to ten days; then the cloths must be removed, and the wound left bare, dressing it daily with suitable caustic lotions. A good blister, and run at grass, are at times necessary, but the skin once destroyed is never reproduced. In treating these cases, great care is required in dieting the animals, keeping them cool and quiet, as at times lock-jaw supervenes.

Speedy-cut.—This is a bruise on the inside of the fore leg. It may be between the knee and fetlock; at the knee; or, even, in a high-actioned horse, above the knee. It comes under the class of contused, or bruised wounds, and is caused by the horse striking the inside of one fore leg with the opposite foot; very careful shoeing is required, while the damaged part should be treated as under contused wounds. (*See page 38*).

Sprains of the Tendons or Back Sinews may be said to be lacerations of the tendinous fibres, causing heat and a painful swelling. These usually occur below the knee, just where the interior check ligament joins the tendon; but any portion of the latter is liable to lesions. They are most frequently seen in the fore legs, and, in cart horses, having heavy lifts to pull up steep hills, high-heeled and high-toed shoes may have something to do with causing them; while, as other sources, we have slipping on ice, over-reaching in jumping, &c. The animal steps short, and rests the limb whenever it has a chance. On examining the leg, the damaged part is easily felt. The most essential point towards recovery, in such cases, is entire rest from work; but this rule is “more honoured in the breach than in the observance,” and the poor brute is frequently kept at work till repair is hopeless. First then, as already said, entire rest; next, cold water bandages. The shoe must be removed, and the

heel slightly elevated, so as to act as a support to the part. After the active symptoms have abated, blistering should be resorted to, and the animal turned out to grass. Firing, before turning out, may be necessary, and generally has a good effect. When the animal is worked too long, and the case neglected, the tendon becomes so much contracted, that the fetlock knuckles over, and the animal walks on its toe. A special shoe is required for this, with a turned-up point, and the operation of **Tenotomy**—dividing the tendon—is required. From this, it will be seen how highly necessary it is to give rest in the first stages, and thus obviate future ill-consequences.

Break-down.—This is of common occurrence in racehorses, steeplechasers, and hunters. The suspensory ligament, or even the tendons themselves, give way, allowing the back of the fetlock to come to the ground. Cold water bandages, with splints, must be applied, until the active inflammation is arrested; the animal should be put on slings, and dieted on mashes, or green food; finally, a plaster-of-Paris bandage ought to be applied, and the horse turned out to grass.

Sesamoiditis is inflammation of the joint at the back of the fetlock, due to some injury, either to the small bones, or to the tendon passing over them. The parts are much swollen, and tender to the touch; while the fetlock stands forward, and the animal steps short. When certain that this is the seat of lameness, cold water applications should be used first, with complete rest; then blistering must be resorted to.

Hip-Joint Lameness, or sprain of the tendon passing over the head of the hip-bone. As in the fore leg, the shoulder was generally considered the seat of lameness; so, in the hind leg, the hip is often pointed to, when the cause is really in some portion of the limb below, thus showing that lameness in this part is by no means easy to trace, as it may arise from muscular sprain, or nervous derangement—as sciatica; so that before any treatment is adopted, a qualified practitioner should be consulted, as I have often seen a large surface of the skin permanently damaged by the use of

some fancy advertised quack nostrum, the animal having rubbed the part after application, and thus destroyed the skin. When certain that the lameness is in the hip, rest, with cold water irrigation, for two or three hours, twice daily, is of great service. Blisters and setons are frequently of great benefit.

Windgalls.—These puffy elastic swellings are of very common occurrence in nearly all classes of animals. They are caused by over secretion of synovia, or joint oil, and are found at the knee and fetlock joints, &c. Some stamps of animals are more prone to them than others. The swelling may be brought on by overwork, or by putting the animal to work too soon. They very rarely cause lameness, or in any way interfere with the usefulness of the animal, but still they are objectionable, and are not easily removed. Their treatment consists of rest, cold water bandages, indiarubber bandages, and blistering; and firing, when they are large. In olden times, they were supposed to contain wind, hence the name.

Bog Spavins are found on the front and inner part of the hock joints. They are of the same nature as windgalls, being over-distensions of the capsular ligament of the hock joint with synovia. They are mostly seen in cart horses,—certain strains of Clydesdales having a special tendency towards them. They are frequently found on young horses rising two years old, more particularly in over-fed, forced animals. They very rarely occasion lameness, and sometimes disappear without any treatment. If hard feeding is thought to be the cause, it should be diminished, and the animal turned out to grass, after applying a good dressing of green tar; compression, by means of india-rubber bandages, has a splendid effect; but when lameness is present, blistering and, subsequently, firing have to be resorted to. At times we have associated with Bog Spavin another distension of the hock joint, viz :—

Thorough Pin. This consists of an enlargement of the sac, through which passes one of the tendons, and is situated behind the main joint, and in front of the **Os-Calcis**, or point of the hock. It varies very much in size, and is generally seen more prominently on the outside than on the inside, or *vice versa*, and sometimes is right

through. Pressure on one side makes it more apparent on the other. It seldom causes lameness, but, being unsightly, is very objectionable. The treatment greatly resembles that for Wind-galls. Indiarubber bandages are useful, or a truss specially prepared for the hock joint may be used, causing compression and absorption. A winter's run at grass, with green tar dressings, have been found to answer splendidly. At times the enlargements are tapped, and the over-secretion drawn off, but this should only be attempted by a professional man, as it is very dangerous to admit air into a synovial or serous cavity.

Capped Hock. This is of frequent occurrence, and consists of a swelling on, and covering the point of, the hock, caused by kicks or other bruises; when recently done, it is very painful to the touch. Soothing treatment is necessary, such as hot or cold applications accompanied by cooling lotions; stimulating embrocations are to be avoided, as they have a tendency to consolidate the effused products and form a *callus*. When inflammatory action has subsided, iodide of mercury ointment may be applied. The swelling should never be pricked or punctured, as there is great danger in these operations. Some animals cause capped hocks by scraping all their litter behind them, and then lying down on the bare brick or pavement. This may be remedied by bedding thickly with sawdust or moss litter.

Curb is an enlargement on the back and lower part of the hock joint, where the shank bone joins. We have two kinds of Curb—false and true. False Curb is due to a sharp blow on the part, causing an effusion of serum under the skin. The treatment consists of hot fomentations, or cold water applications, followed by iodine blister.

True Curb is of a more serious nature, and consists of a sprain of the tendon passing over the seat of curb, or laceration of the calcaneo-cuboid ligament, at its attachments to the cuboid and large metatarsal bone. This is caused by over-exertion, as galloping, jumping, rearing up, &c. Some breeds of horses have joints natur-

ally predisposed to Curb—called **Curby Hocks**. In this, the head of the metatarsal is set too far back ; the point of the hock is too short and straight up, forming a narrow joint, with a sharp angle at the lower part of the front of it. This class of joint is more subject to injury than a well-formed, broad, and developed one. When the enlargement is seen, and the animal is noticed to be lame, or tender, it should be laid off work, and cooling applications used—such as the hose-pipe irrigation of cold water, or cold water bandages—until the inflammation is reduced ; then, iodine or fly-blisters must be used, but the best, and most satisfactory treatment for Curb, or Curby Hocks, is to fire, in lines. I know of no complaint, except Spavin (page 34), on which firing has such a beneficial effect as Curb.

Open Joint.—All the joints are liable to be laid open from kicks, probes, and other injuries. The most frequently damaged in this manner are the knee, elbow, stifle, and hock. The three latter are very formidable to deal with, and, owing to their arrangement, are difficult to treat successfully.

When a joint is opened into, it should have immediate attention, or it may end in a stiff joint, or even in the death of the animal. As soon as it is ascertained that the discharge coming from the wound is joint oil, entire rest must be given, and cold water irrigation resorted to. The water must be kept running constantly over the part for four or six days. I have, on many occasions, with this treatment alone, been successful in stopping the synovia, and healing the joint. Next to this, is the application of a good fly-blister, which has generally the desired effect ; it causes the parts to swell, thus closing up the opening in the joint and preventing the admission of atmospheric air. Creosote, oil of cloves, or carbolic acid may be applied to the wound, if thought necessary.

Stifle Joint.—The structures in connection with this joint are frequently the seat of injury and disease. Some breeds of horses are more susceptible to contract diseases and distensions of this joint than others. Young animals—more particularly of the cart-horse class—are subject to big or distended joints, with **luxation** of the **patella**,

of a hereditary nature. These, as a rule, are very poor, and bad thrivers ; and when they stir or walk about, the patella, or cap, slips partly off the joint, towards the outside, making a crackling noise. The treatment consists of repeated blistering, which sometimes does good ; but so unsatisfactory, as a rule, are the various treatments, that the best plan is to destroy the animal, as it scarcely pays to bring up for work, and is no good to breed from.

Dislocation of the Patella.—Grown-up horses sometimes throw off the cap by jumping up too suddenly. I have seen several cases occur in this way. When dislocation takes place, the cap comes to the outside, on account of the ridge on the femur being less on the outside than on the inside. The leg is extended behind in a rigid condition, the front of the point of the toe resting on the ground with the sole of the foot looking upwards and backwards. The animal must be got into the yard, a neck collar put on, and a strong rope passed through the bottom of the collar, between the fore legs, and tied round the pastern joint of the dislocated limb. The foot must then be pulled forcibly under the belly, until the sole can rest flat on the ground ; the cap must now be manipulated to the front, and held there, when, on the horse stepping forward, it readily drops into its place. A good blister should be applied, and the animal tied up short for a week or so, to prevent it lying down, as once the cap is disturbed, it is apt to again become displaced.

Hip Joint Dislocation. From extensive injury, this joint occasionally becomes dislocated, usually accompanied by a fracture. The leg seems much shorter than its fellow, and does not reach the ground. When the dislocation is forward, in front of the cup, the back of the leg hangs, pressing against the front of the shank bone of the opposite leg, and when the dislocation is backward, the front of the leg presses against the back of the shank of its fellow. I have never attempted reduction. When the muscles are so extensively lacerated, and the swelling so great, the animal is usually destroyed.

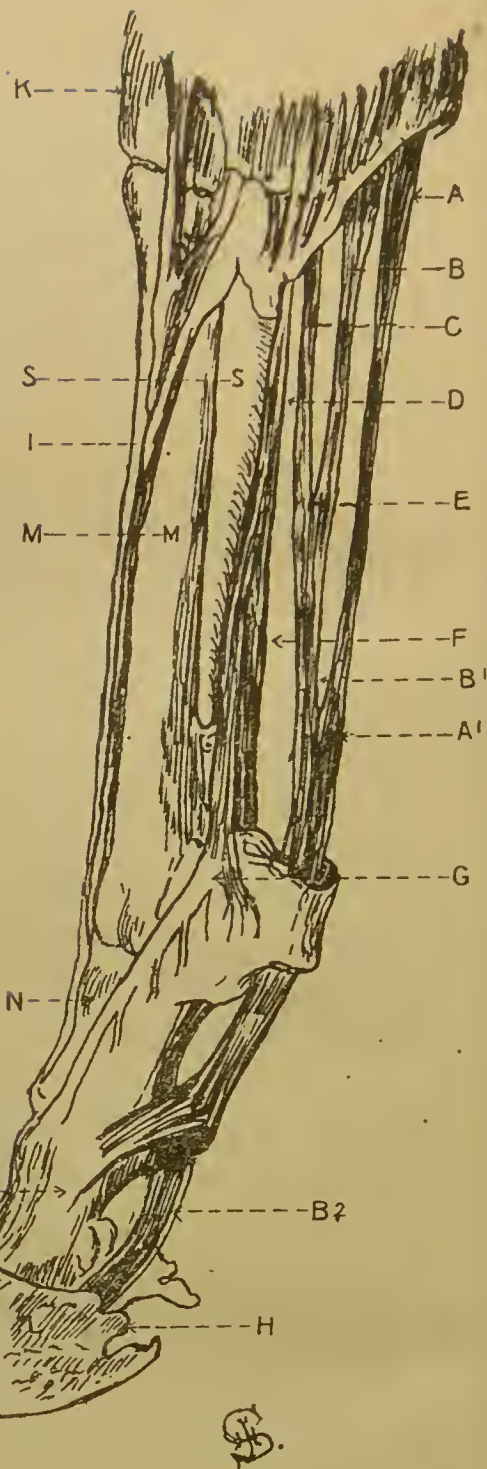




FORE-LEG FROM KNEE.

From FITZWYGRAM, (SCOTT).

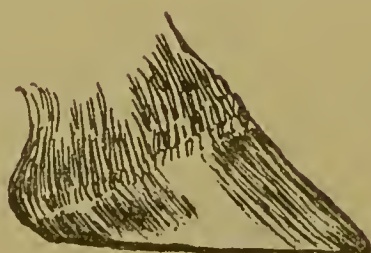
- A. Flexor Perforatus.
- A1. Flexor Perforatus
- B. Flexor Perforans.
- B1. Flexor Perforans.
- B2. Flexor Perforans.
- C. Metacarpal Ligament.
- D. Suspensory Ligament.
- E. Insertion of Metacarpal Ligament
into Perforans.
- F. Bifurcation of Suspensory Ligament.
- G. Continuation of Suspensory
Ligament.
- H. Coffin Bone.
- I. Extensor Tendon.
- K. The Knee.
- M. Metacarpal Bone.
- N. Os-Suffraginis.
- O. Os-Coronæ.
- S. Splint Bone.



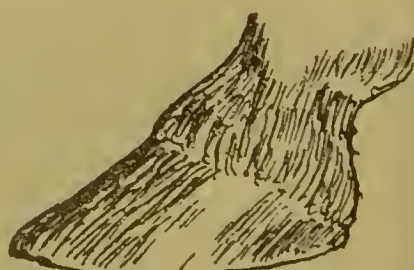
N° 1



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N° 3



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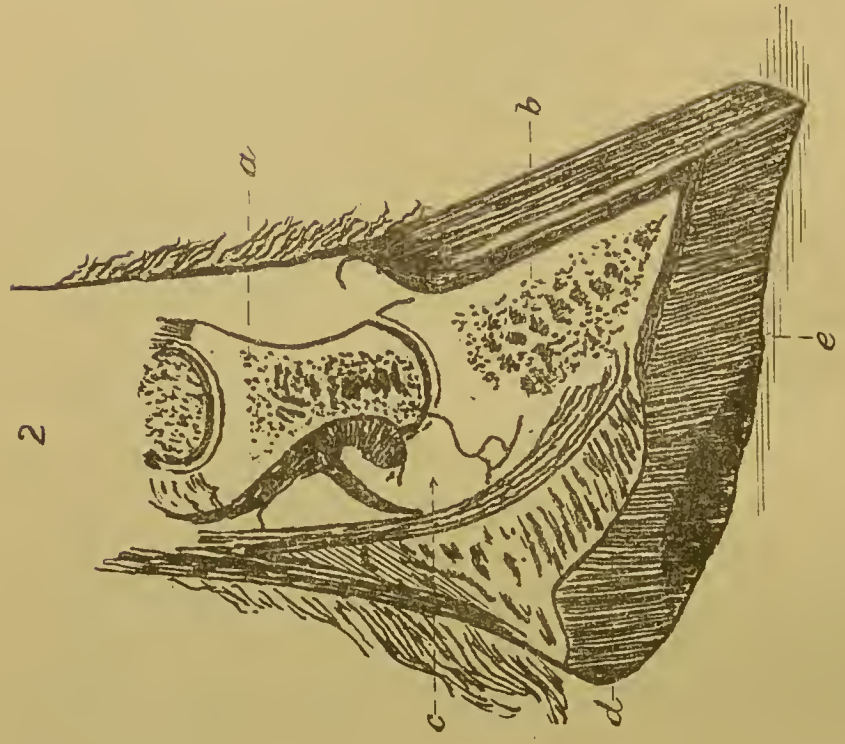
FOURTH LECTURE.

THE HORSE'S FOOT, OR HOOF.—SHOEING, &c.

THE Foot, or Hoof, as it is generally called, is made up of the non-sensitive **Wall** or **Crust**, **Bars**, **Sole**, and **Frog**. The **Wall** is that portion seen when the foot is placed flat on the ground, and is divided into **Toe**, **Quarters**, and **Heels**, where it turns inwards, and forms the **Bars**, which run on each side of the frog, on the ground surface, towards the toe. It is thickest at the toe, becoming thinner as it reaches the quarters; the outside quarter, or *spread* of the foot is more rounded than the inside, which is nearly straight up.

The Wall is said to contain about 25 % of moisture, and, externally, has a smooth, fibrous-like appearance. These so-called fibres are, in reality, small tubes, filled with, and matted together by, a gelatinous matter; they run from the top of the hoof to the bottom, in an oblique manner, and are extracted, or secreted, from the blood by the action of the **coronary band**, or cushion, which lies in the hollow groove running round the top and inside of the hoof. The internal portion of the wall has a leaf-like, or **laminated**, structure, which dovetails into the sensitive laminæ surrounding the coffin bone. It has been estimated that there are 500 or 600 of these non-sensitive horny, and a like number of sensitive, laminæ, each being again studded with about 100 secondary ones, like the barbs of a feather, making the dovetail more complete. These give a surface to the foot, estimated to be equivalent to eight square feet, or a total area, for the four feet, of 32 square feet.

The Sole is the under, or ground, portion of the hoof, and is slightly concave, filling up the space between the **Bars** and the ground surface of the **Crust**, or **Wall**. The horny matter in it consists of thin plates, which flake, or fall off, at the ground surface, successively, when they have done their work. The internal surface presents a very fine honey-combed appearance, with little depressions, into

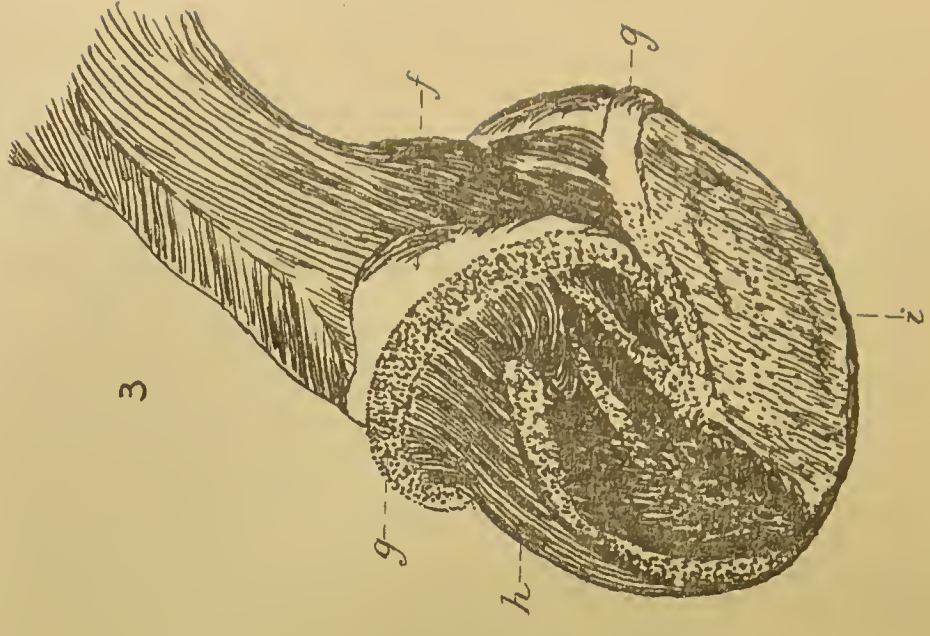


HORSE'S FOOT.

1. The Foot with Skin and Hoof removed, showing Arteries and Veins ramifying to form a beautiful network.

2. Foot sawn through the middle.

- a.* Coronet Bone or Small Pastern.
- b.* Coffin or Pedal Bone.
- c.* Navicular or Shuttle Bone.
- d.* Sensitive or Fatty Frog.
- e.* Non-sensitive or Horny Sole.



3. Foot without Hoof.

- f.* Lateral Cartilage.
- g. g.* Coronary Band.
- h.* Sensitive Lamina.
- i.* Sensitive Sole.



is described as rejoicing in his strength, and smelling the battle afar off. Horses, horsemen, and chariots, and trading in horses, are referred to in many places, *e.g.*, II. Kings, xviii., 23 ; Ezekiel, xxvii., 14 ; Zachariah, vi., 2, 3 ; thus showing the general usefulness of the horse to mankind.

In the earliest ages, attention had been drawn to the brittle nature of the horse's hoof ; for in Judges, v., 22, we find : " Then were the horsehoofs broken by the means of their prancings." In the ancient Greek and Roman journals, we find that armies had to be disbanded in consequence of the horses' hoofs breaking and wearing ; while Suetonius and Pliny, as well as other historians, specially record frequent incapacity from the wearing of the hoof.

The exact time when shoes were applied to the horse's feet is not known. The Persians, however, get the credit of being the first to use them. In a Mosaic painting of Pompeii, a shoe is noticed on the foot of the warhorse of Satrapes—B.C., 333. In the year 481, A.D., an iron shoe was found in the tomb of Childeric, King of France.

William the Conqueror is said to have introduced the art of shoeing into this country.

The horse's foot has been a subject of deep study for centuries ; and I know of no mechanical contrivance which the mind of man can contemplate with greater wonder and admiration. If there is one thing more than another, which has a tendency to technology, it is the art of " horse shoeing." For the shoer to have a knowledge of the different feet, frame the various kinds of shoes, and attach them properly, and then give a reason for his work, is, I think, one of the finest examples of Technology, or " Science with Practice."

The condition of our roads and streets is such that it is necessary to protect this beautiful structure from injury ; therefore, shoeing becomes a necessary evil, requiring science and practice for its proper application ; and, owing to the great variety of feet met with in the different breeds of horses, and the peculiar formation of some of the hoofs, horse-shoeing is rendered of more account than is really

thought. What is the use of a horse, however good and well-fashioned, if it has not a foot to stand upon ?

Varieties of Feet.—Among the different types of feet are the following :—

1st.—That which is called a good, strong, sound foot, has its front wall inclined at an angle of 45° . The colour is of a bluish flinty hue, with the outside wall more rounded than the inner, and with a good concave sole.

2nd.—Is similar to the first, only the heels are much higher, and the quarters, and toe, more upright. Feet of this kind, although serviceable, are, in light-legged horses, more liable to contraction, and **navicular disease**; while in cart-horses, they are most subject to **side-bones**. The walls and soles are generally strong and hard, and require a great amount of care in shoeing.

3rd.—Some classes of cart and harness-horses have great flat feet, with very large frogs, and wide, open, weak heels (showing that when the frog meets the ground pressure, the feet expand at the back), and the sole, as a rule, instead of being concave, is flat. Horses with feet of this kind are certainly useful, but they are best on farms. Such feet are frequently affected with corns and bruises, and are difficult to shoe.

4th.—**Dished Feet, or Hollow Wall and Rounded (Convex) Pumiced Soles** are somewhat similar to the last, but are more prone to bruises and disease than any other kind of feet, requiring very careful shoeing, with a shoe well seated on the surface next the sole.

5th.—**Odd Feet.**—Curiously enough, these are often seen in racehorses, and, although one is smaller than the other, there is no disease, and the small foot stands as much wear and tear as its larger mate. These feet generally resemble varieties Nos. 1 and 2.

A horse's feet, however, may become of different sizes by frequently pulling the shoe off one of them, which is done by the animal galloping round in a circle, the inside fore shoe being apt to be

clinked off by the hind one on the same side; and each time the shoe is replaced, the foot decreases in size; still, there is no disease. But the foot may also become smaller from disease.

Again, different kinds of shoes are required, according to the horse, and the work it has to do:—

1st.—**Racehorses** require only a very narrow plate, merely covering the ground surface of the wall. The French or Charlier system would suit these. In this form of shoeing, a groove is made round the ground surface of the wall, into which the shoe is fitted, there being no covering on the sole. It certainly gives the frog full play; but I am afraid it would not answer for animals in use on our macadamised roads and streets.

2nd.—**Hunters** are generally shod with a broader web—having a flat face next the sole, which it slightly covers, well seated, and grooved on the ground surface, imitating the bottom of the foot, so as to get a better grip of the ground.

3rd.—For **Hackneys** and **Carriage-Horses**, a shoe is generally adopted that is well seated on the inside, next the sole, with a good flat, level bearing at the heels, and round the bottom surface of the wall.

4th.—**Cart** and **Waggon-horses** have shoes made similar to those for carriage horses, but much heavier and broader, being seated on the surface next the foot. They are generally turned up at the heels (caulkings), and have a toe-piece. This turning up of the heel, more particularly in dealing with a young horse, is a great mistake. It should be shod flat, as the heels lift the foot from its centre of bearing, and the frog is taken away from its proper work. This will be fully explained under **Side-Bones**. (*See page 59*).

5th.—**Bar Shoes** are used for weak-heeled horses, or where there is damage done to the quarters. They give additional support and pressure to the frog.

6th.—**Round Shoes** are something analogous to the bar shoe. They are very useful for weak feet, and also in cases where there has been extensive inflammation—**Laminitis**. Their ground surface is

formed in the shape of a rocker, thin at heel and toe, and thick at the quarter, so that when the horse puts its heel to the ground, the foot rocks gently over, and the animal is assisted very much in progression.

7th.—Three-quarter Shoes. Where we have disease of, or injury to, either outside or inside heels, a shoe is made with a bar to lie across the frog, while the side of the shoe next the damaged part is cut off to prevent pressure.

8th.—Diamond-toed Shoes have diamond points, and are used on the hind feet, to prevent the horse from “forging,” or “clinking”—that is where the toe of the hind shoe strikes the ground surface of the fore foot shoe. A young horse, when first put to work, nearly always acquires this habit of “hammer and pincers,” as commonly called ; but, as it gets into step, this, in time, leaves it.

9th.—Feather-edged Shoes.—These are called preventive shoes, and are more frequently used on the hind than on the fore feet ; they are used for animals that buff themselves, by striking the fetlock joint, or shank, of the opposite leg. Some young horses are very subject to this. For treatment of these bruises, see “Contused Wounds” (*page 38*). The shoe is made with a feather-edge on the inside, tapering inwards, on the ground surface, towards the frog ; nailed on the outside, and round the toe. Indiarubber rings, and woollen bandages, are also used to protect the opposite leg from further injury.

In all cases where there is a good, healthy, well-formed foot, with concave sole, the surface of the shoe next the foot ought to be flat, so as to give a little pressure to the sole. In weak, convex soles, however, the shoe should be seated so as to meet the requirements of the case.

Preparing the Foot for the Shoe.—A young horse, when first brought in from grass, is best when put into a loose, open shed, for ten days or a fortnight before the shoes are applied to the feet. The ground surface of the crust ought to be levelled with a rasp, to make a good bed for the shoe, which should invariably be a plain one, without heels ; and, on no consideration, must the shoe be applied

too hot to the foot, as I have, on several occasions, seen founder (**Laminitis**) caused by the application of this. In future shoeing, the clinches ought to be carefully turned back, and, if possible, each nail drawn separately, thus preventing the edges of the crust being broken ; the rasp may then be run gently round the sharp edges of the crust, and, as the foot always grows in length at the toe—and very sparingly at the heels—it must be shortened. This is usually done by cutting a piece from the front of the wall, at the toe, to which I have great objections. The foot should be shortened by dressing down the ground surface from one quarter round the toe to the other. This, when properly done, gives a level bearing for the shoe, preventing pressure on the heels, without having to spring the heel of the shoe. In paring the sole, only the rough loose flakes ought to be removed, except in **Navicular** disease, where we have, from continued irritation, an overgrowth of horn ; *the sole must then be thinned.*

Farmers, themselves, are very much to blame in not paying more attention to their horses' feet : no foot, no horse ; that is to say, no matter how grand and good the animal may be otherwise, it is of very little account, if it has not sound feet. Sometimes they allow a horse to go three or four months without being re-shod, by which time, the feet are so overgrown, and in such a state, that it takes months to get them into condition again. It would be much better to take the shoes off altogether, and then the foot, with use, would naturally wear away. Shoes are best removed once every four or six weeks, and should never, on any account, be allowed to remain longer than two months.

Fitting the Shoe.—The shoe must be made to fit the foot, not the foot the shoe. It should be made to fit level, and a shade larger than the foot, so that the upper surface of the shoe projects slightly beyond the foot, the ground surface being still larger, continuing the angle of inclination of the wall of the hoof. As already said, it must not be applied too hot—just hot enough to make itself a firm bed ; neither must it be nailed to fit, as this tears the hoof.

Nails.—The fewer the better ; but, as a rule, four nails are put on the outside, and three on the inside—more are used at times, but if the shoe is efficiently fitted, a less number may be requisite. The nail-holes should be made so that the nails can be driven through the solar part, in a straight vertical line up the non-sensitive crust, as when made obliquely, the nails are apt to break off at the neck. Some feet are so constituted that the shoe has to be nailed round the toe, instead of the quarter. In driving the nail, care should be taken not to get into the sensitive parts, nor to get so near as to press on them. This shows how necessary it is to fit the shoe properly, and, also, to make the nail-holes at proper angles. After the shoe has been attached, in dressing the hoof, some smiths persist in rasping the walls — “to make them look nice,” they say. To my eye, nothing looks worse than a rasped hoof. By the use of the rasp, some hundreds of the little fibrous tubes, which are seen running from the top to the bottom of the hoof, are wounded and left exposed to the action of the atmosphere, which makes the hoof turn hard and brittle, breaking off where the nails are turned down, or clinched. I thus, strongly say, that the knife and rasp ought to be used sparingly, and with great caution. *The hoof must not be rasped above the clinches on any account.*

Stopping for the Feet.—In long-continued frosts, or a spell of hot, dry weather, where a horse is doing a lot of work on the hard road, it may be necessary to apply some stopping to the feet, to keep them cool, moist, and pliable. I have never yet found anything to beat cow-dung and clay, equal parts, stuffing the bottom of the feet each alternate night.

Leather Soles should never be used except in cases of injury, when they become necessary ; for healthy action of the hoof, air should be allowed free access to all parts. **India-rubber** pads, to prevent slipping, may be used, when necessary.

Exercise is very essential, in order to keep both the outside and inside of the foot in sound condition. Without it, healthy circulation cannot be maintained in the foot, and the result is, disease ; therefore, if a horse cannot be taken out every day, it should be turned into a loose box, or paddock.

INJURIES TO, AND DISEASES OF, THE FEET.

The foot is at all times very liable to injury, and in all cases of lameness—even though the leg be broken—the foot should be examined well, to make sure that all is right there.

A Prick from Shoeing, or otherwise.—This is the most common injury to the foot. In shoeing, if a nail be unfortunately driven into the sensitive parts of the foot, the owner ought at once to be told of the misfortune, when the shoe must be removed, and the foot put into a bran poultice, made with cold water, and kept constantly wet for a few days, when the part generally heals without any bad effect. But, as a rule, the nail is withdrawn, and no mention is made of the injury; the horse is put to work, and, in the course of two or three days, becomes lame. On removing the shoe, and pressing the foot with a pair of pincers, the damage is indicated by the animal flinching when the part is touched. The sole must be dressed away, until a dirty thin fluid is met with (commonly called gravel), at the bottom of the nail-hole. If left alone too long, this fluid sometimes works under the sole, and, if not liberated, will find its way out at the top of the band of the foot, or bulbs of the heel. After the escape of the matter, the foot should be cold-bran-poulticed, until all the inflammation has subsided; then, after dressing with tow and tar ointment (*see Sandcrack*), and protecting with a leather sole, the shoe may be put on.

Sometimes the nails are driven too near the sensitive parts, without touching them, and cause the animal to step short, or even walk lame. By taking off the shoe, and poulticing the foot, for 24 hours, the animal, as a rule, is put all right again.

When a horse drops suddenly lame on the road, the foot must at once be examined, to see whether it has been injured by picking up a nail, or a piece of wire. If this is found to be the case, remove the foreign body at once, and, at the first house on the road, heat it in the fire, and, with a pair of pincers, press it into the hole already made, thus cauterising the wound; a little hard soap may then

be rubbed into the part, after which, as a rule, no further trouble occurs, but, should the animal become lame afterwards, take off the shoe, and poultice the foot, as already stated.

Pricks from nails are very dangerous, if neglected, as I have seen a number of cases of Tetanus (lock-jaw) caused by a simple prick in the foot; yet, strange to say, at the pit-bottom—where I have the most frequent cases of pricks—I have never had one case where lock-jaw supervened.

Corns are caused by a bruise, or injury, with infiltration of blood through the pores of the horn. They are generally found in the fore feet, principally in the *inner* corner of the heels, between the wall and bars—occurring chiefly in flat-footed, weak-heeled horses. Hunters are great sufferers from this class of injury, owing to their being shod with short-heeled shoes.

The shoe should be removed, and the parts dressed out; if the bar is too strong, and doubled over, it must be pared away, so as to remove all pressure from the part.

In bad cases, poultices have to be applied, to reduce the inflammation, while a three-quarter, or bar shoe, is, at times, found to be necessary. If neglected, the inflammation extends to the internal parts of the foot, coming out at the top of the quarter, and causing much uneasiness to the animal, and ending in

Quittor—a most painful and troublesome fistulous disease of the foot. Injuries, of any description, to the foot, may end in quittor. It is not often seen in the country, but in towns is very common. Railway horses are very subject to it, owing to getting their feet fixed in the rails, and waggons or carts passing over them. The structure of the foot becomes so much diseased (hard and soft parts alike), that holes, or sinuses, are formed all round the band. At first, cold water poultices may be of some service in reducing the active inflammation; but when the disease has become chronic, blisters and caustic dressings should be applied; while, as a last resource, an operation has to be performed, by which the diseased bone and

cartilage are removed, making the complicated sores into one simple wound. These cases are much too formidable for the attempts of an amateur.

Side-Bones consist of ossification of one or both lateral cartilages, situated at the sides and top of the hoof. They are met with in the fore feet, particularly in those cart-horses, which have strong upright quarters ; but are very rarely found in flat-footed horses, hacks, or carriage-horses. The principal causes are hereditary predisposition, injuries of various kinds, over-reaches, chafing against the sharp edge of a lea-furrow, &c. ; but, in my opinion, the greatest evil of all is the use of high-heeled shoes, removing the frog from its ground pressure, thus throwing the weight on the lateral cartilages. Above the horny, or insensible frog, there are elastic fibres running from the inside of one lateral cartilage to the inside of the other, forming what is called the fatty, or sensitive frog, into which is inserted the frogstay, or elevation corresponding to the cleft in the middle of the ground surface of the frog. Now, when the weight of a horse is thrown on the foot, the pastern descends, the lateral cartilages yield and bend outwards at the top of the hoof, about the middle of the cartilage, whilst the top of the cartilage bends over, acting like a spring, letting the weight of the limb gently down on to the fatty frog, which, in turn, presses on the insensitive horny frog, bringing it in contact with the ground, thus preventing concussion. But, when a horse is shod with heels, the horny frog becomes displaced, as it were, and thrown out of work, and all the weight is put on to the lateral cartilages, which, in time, through having all their own work, as well as that of the frog, to do, become ossified, and form side-bones. Again, shoeing-smiths—particularly those in the country—have a very great fault in cutting away the sides of the horny frog. It ought never to be touched : when cut into, the layers flake off, the frog becomes very ragged, and wastes away—more particularly when it does not come in contact with the ground—in many cases conducing to side-bones.

When side-bones cause lameness, remove the shoe, and apply cold water poultices—then ease the shoe, or substitute a bar shoe.

In a very great proportion of cases, there is no accompanying lameness, and little or no inconvenience ; but, nevertheless, they are always considered as unsoundness. Both sides of the foot may be affected, or merely one. When they are very large, and cause much lameness, the hoof may be cut through, at the quarter, from top to bottom, in two places, just below, and at either side of, the side-bone ; then divide the sole from the crust at the bottom of the foot, when the piece becomes loose, and springs open, on the horse putting its weight on the foot. A bar shoe is put on, and in a few months the foot expands, and the horse goes sound.

Sandcrack is described by many writers as a solution of continuity in the wall of the hoof. My definition is :—A fissure, or separation, of the horny, fibrous tubes, to a greater or less extent. It is more common in the town than in the country, occurring most frequently on the inner quarters of the fore feet, at times extending from the top of the hoof to the bottom. When slight, it causes little or no inconvenience ; but when the fissure extends into the sensitive parts, and any dirt gets in, inflammation sets up, and matter is formed. This must be liberated by cutting each side of the crack, dressing with carbolic oil, and applying poultices ; after getting rid of this, a nick should be made with a hot fire-iron across the top of the crack, close against the hair, and the fissure dressed with tar ointment and tow. Then a tarred rope may be wound round the hoof, or a leather strap used, or, even in some cases, a specially constructed clasp may be advisable. The shoe must be eased below the crack, while cold water cloths, or swabs, put round the hoof every night, have a very good effect. To counteract the brittle nature of the hoof, a mixture of one part of green tar, and three parts hard fat, or palm oil, melted together, applied round the top of the hoof twice a week, will be found to answer admirably.

Seedy Toe consists of a peculiar degeneration of the horn of the foot, which assumes a soft granular appearance greatly resembling sawdust, and occurs at the point of the toe, generally of the fore foot. This, like the former complaint, is more frequently met with in town than in country practices, affecting, chiefly, waggon or cart-

horses. It may exist for a considerable period before any lameness is noticed, and is produced by anything interfering with the true growth of healthy horn; the most common cause being too large a clip on the toe of the shoe, which, being hammered tightly on the hoof, produces pressure, and interferes with the horny growth. The shoe should be removed, the place well cleansed, and some stimulating dressing applied, nothing being better than the tar ointment recommended for Sandcrack. Tar, by itself, must never be used, as it is too stimulating, and causes a crumbling of the horn. As the morbid horn is only found on the removal of the shoe, it should always be taken off in examination for soundness.

False Quarter is the name generally used where an overgrowth of horn, usually caused by some injury to the coronary band, is formed. This overgrowth, which is much harder than ordinary horn, seems to overlap the hoof, so that the part at which the normal horn and this overgrowth meet, has all the appearance of a Sandcrack. It cannot be regarded as an unsoundness.

Thrush is a fœtid discharge from the cleft of the frog, varying in character. Some formations of feet are more prone to this than others. It is generally produced by the animal standing in a wet, filthy stable or box, and can exist without causing any lameness whatever; if neglected, however, it may run on until it implicates the sensitive parts, and destroys the healthy growth of horn. A change on to good dry bedding in the first instance, bathing the parts nightly with salt and water, and dressing every morning with carbolised oil — pressing the oily tow into the bottom of the frog cleft with a flat stick—will generally have the desired effect. Neglected Thrush may run on into that formidable disease called

Canker—a morbid fungoid growth of horn at the bottom of the foot. This may also be produced by injuries; standing in a filthy, wet stable, or box, &c.; greasy-legged horses being prone to it. Instead of the ordinary horn, little soft, spongy, sprouting growths are seen, which bleed on the slightest touch. It is usually first noticed on the solar part of the heel and frog, and it may extend all over the sole. Being of a very formidable nature, it is very difficult

to treat, and should never be tampered with by amateurs. The animal must be at once put into a dry box, as moisture encourages the spongy growths, which develop rapidly. I have been most successful with daily dressings of powdered alum and dry tow, placing the animal on dry ashes instead of straw, and promptly removing all wet matters, such as fæces, urine, &c., as soon as observed.

Treads and Overreaches. These are caused by the hind foot overreaching on to the heel or quarter of the fore foot, or by one foot treading on its fellow. Washing the parts well with clean cold water, and dressing with carbolised oil will be found to answer in ordinary cases. Should the underlying parts be damaged, and the animal go tenderly, and show pain, cold water cloths or poultices must be applied until the inflammation is reduced.

Navicular Disease, commonly called **Groggy Lameness**, may be defined as inflammation and ulceration of the articular surface of the navicular, or shuttle, bone, situated at the back of the coffin or pedal joint; or it may be produced by laceration of the fibres of the tendon passing over the bone, to its insertion in the floor of the coffin bone, setting up inflammation and adhesion of the parts.

It invariably occurs in the fore feet, and is in many cases due to hereditary tendency. Injury from fast work, on hard roads, is another frequent cause; but by far the most common is keeping horses in the stable, day after day, without exercise, then, on taking them out, giving them too much quick travelling, thus lacerating the tendon, and setting up inflammation. The first symptom noticed, is the horse pointing first one foot and then the other, so as to ease the tendon as it passes over the acute angle of the bone. When brought out of the stable, the animal digs the point of the toe into the ground, stepping in a short and stiff manner, until it gets warmed up, when it goes fairly well. The shoe is much worn away at the toe, and, as a rule, the feet are very strong, high-heeled, and *contracted*. Owing to the constant irritation within the foot, there is an extra growth of horn, giving a box-like appearance to the hoof.

highly necessary, and very beneficial. If from an overdose of physic, doses of carbonate of soda—one ounce each—may be given in well-boiled thin oatmeal gruel. If retention of the cleansing is the cause, the membranes must be carefully removed, and the womb washed out by means of an injection of tepid water, containing tincture of iron, or some other antiseptic, while antiseptic medicine should be administered. Finally, round rocker shoes (as described under “Shoeing”) must be put on. At times, in severe cases of laminitis, the foot has to be opened at the toe, to let out the effused material, as this effusion is so great in some cases, especially those neglected at the first that, if not liberated, it causes the sole to come down, producing great deformity of the foot, so that founder is by no means a fit case for an amateur to dabble with, and should have professional attendance from the first.

In severe cases of laminitis, the foot becomes elongated at the toe, the point of the coffin bone is dislodged and drops down to the sole of the foot, and numerous rings form round the hoof (*see diagram*). Rings, however, are also formed round the wall of the foot, by changing the animal from the stable to a grazing pasture, or *vice versa*.





HORSE WITH LAMINITIS (FOUNDER), OR INFLAMMATION
OF THE FORE-FEET.

DISEASES OF THE FEET OF CATTLE, SHEEP, AND DOGS.

Cattle are not nearly so subject to foot-diseases as horses. Their most common is **Fouls**, which consists of an irritative inflammation and ulceration between the digits, and is usually caused by the animal standing in a filthy, wet box, or yard. There is acute lameness present, and the foot is swollen round the top of the hoof. The treatment is very simple. The beast should be removed to a clean, thoroughly dry box ; the parts washed with cold water, containing phenyle, or some disinfectant ; dressed with carbolic oil and tow, and the foot poulticed for a day or two. This, as a rule, is all that is required.

I must here strongly condemn the barbarously cruel treatment of pulling a rough rope between the toes, and applying Butyr of Antimony. This latter dressing burns and destroys the parts, bringing on what is termed "*Bastard Fouls*." I have, on many occasions, seen the bones laid bare with such brutal treatment. Simple soothing applications are all that are necessary. *Nails* are frequently found in the sole of the foot. These must be removed, and the foot poulticed, and treated as named in "A Prick from Shoeing" (*page 57*).

Foot and Mouth Disease. Ulcerations and damage caused by this complaint (at present eradicated from this country) were of a very serious character, and in many cases the bones were entirely bare, so that repairs to the damaged parts were most difficult to accomplish.

Foot Rot in Sheep. From long observation, I believe this disease to be very inoculative ; it is most frequently seen amongst heavy, well-bred, and well-fed sheep, folded on long luxuriant grasses. These take too little exercise to wear away the ground surface of the crust, which gets too long, turns up, and presses the sole, setting up inflammation, sometimes at the band of the foot, at other times at the sole. Paring away the overgrowth of the horn every three

or four days, and dressing well with some caustic or antiseptic, such as crude carbolic acid or blue vitriol, has a very good effect.

Sheep affected with foot-rot should on no account be taken on to a farm, or amongst a flock where the disease has never existed. I could relate case after case, where the malady has been carried in this way.

To prevent the occurrence of this complaint, the animals ought to be turned on to some good, sharp fallow, for three or four hours every day.

Dogs. — Sore feet should be well washed, and carefully examined; all foreign bodies removed, and the wounds dressed with oil of cloves, creosote, or tincture of iron.



6th.—**The Small Intestines**, comprise the *duodenum*, 2 feet long; the *jejunum*, 30 feet long; and the *ileum*, 40 feet long. The total capacity of the small intestines is estimated to be about 11 gallons.

7th.—**The Large Intestines** are the *cæcum*, or blind gut, (commonly called the *water-bag*,) 3 feet long, capacity, 4 gallons; the *colons*, *large* and *floating*, 20 feet long, capacity, 12 gallons; and the *rectum*, which is the termination of the intestinal canal, 2 feet long, capacity, 3 gallons.

The estimated average length of a horse's intestines is 97 feet, and total capacity, 30 gallons.

Like the stomach, the walls of the intestines have three coats: outside serous; middle muscular (longitudinal and circular); and lined inside with mucous membrane, which is well studded with glands.

Besides these, there are the accessory digestive organs, which perform functions, assisting digestion, that is, converting the food into such a state that it can be absorbed and taken into the blood, and conveyed by it to the different parts of the system, to be assimilated for their nourishment.

Such are the **Liver**; the **Spleen**; the **Pancreas**, or sweetbread; and the **Portal Vein**. These will be further noticed in "Digestive Organs (B)".

The Processes of Digestion—

1st.—The food is taken in by the lips, which are extremely mobile; this is, in the horse, called the prehensile property.

2nd.—It is then pushed by the tongue in between the teeth; the cheeks, by compressing, assist the tongue in keeping it there, while—

3rd.—It is masticated, or chewed, by the teeth. During this process, the salivary glands pour out saliva (an alkaline fluid, secreted from the blood). This moistens the food, making it easier to swallow, and, also, acts chemically on the starchy matter, converting it into sugar, by the action of a special ferment.

4th.—The food, having been well masticated, is formed by the tongue into a *bolus*, which is passed backwards into the throat, where it is seized by the pharynx, and pressed into the gullet, down which it is propelled by the progressive contraction of the involuntary muscular fibres of that canal, into the stomach.

5th.—In the stomach, it is mixed with gastric juice—a fluid of an acid character—which again acts chemically upon it. For the better accomplishment of the process, the food is being constantly rolled about, or “churned,” by the action of the different muscular coats of this organ. The flesh-forming matters—albumenoid portions, or *proteids*—are converted into the more soluble *peptones*, when a portion of the nutritive elements is here absorbed, and carried into the **portal vein**, thence to the liver, while the rest of the food is brought to a soft-soap like material, called *chyme*.

6th.—This *chyme* is next passed on into the small intestines. Here it is met by the *bile* (which the liver is constantly manufacturing), the *pancreatic juice*, or intestinal saliva (formed by the *pancreas*), and by the juices of the various small intestinal glands. The pancreatic juice, which is alkaline, and strongly resembles saliva, has a powerful action on fats, converting them into a soluble form, so that they are capable of being absorbed, while the great function of the bile is that of a disinfectant, assisting in emulsifying the fats. By its presence, putrefaction of the food is prevented. It is also the natural purgative of the body.

The different kinds of food having now been acted upon by the fluid secreted by the salivary glands and stomach, as well as by the *bile*, *pancreatic*, and *intestinal* fluids, the *chyme* is converted into a milky-like emulsion, called *chyle*. While this process is going on, a portion of the new materials is absorbed by the vessels of the intestines, and carried to the portal vein, thence, also, to the liver.

By the action of the muscular walls of the bowels, the *chyle* is forced along the intestinal track, when numerous little bodies called *lacteals*, studded all over the lining membrane, select more of the nutritive matters, which are carried by the lymphatic vessels into a receptacle, commencing under the backbone, in the lumbar region,

and called the **Receptaculum Chyli**; here they meet with other materials absorbed from the posterior parts of the body, and, along with these, are carried by the **Thoracic Duct** into the blood, by one of the **Veins**, just before entering the right side of the heart, and, by means of the circulation of the blood, are distributed to all parts of the body, while—

7th.—The unabsorbed residue, being that which is indigestible, or in *excess of requirements*, passes along the intestines, and is expelled by the rectum as *fæces*.

I may here mention that a horse should never be watered *after* feeding, as it has a very small stomach. It is generally believed that if you give a feed of oats, say, and a drink of water, in close succession, the water will wash the oats in front of it right along the 72 feet of small intestines into the *cæcum*, or blind gut. The food has had no chance of being digested, consequently fermentation occurs. Whether this is so or not may be a question, but from the smallness of the stomach, a horse can drink more water at a time than would fill that organ; therefore, it is a safe rule to give water before feeding. In cold weather, let the horse's drinking water stand in-doors for some hours before use, to take the "chill" off, and then give from half to one pailful, or so, *before* its food.



INJURIES TO, AND DERANGEMENTS AND DISEASES OF, THE DIGESTIVE ORGANS.

1st.—*The lips* are liable to many injuries, as they may get torn with nails, hooks, thorns, &c. They are also subject to warts, or angle-berries. These growths, if large, may be cut off with a knife, or pair of scissors; if very small and numerous, an application of acetic acid, twice a week, may be found beneficial.

2nd.—*The roof of the mouth* is often the seat of injury. In cows and dogs particularly, pieces of turnip, wood, leather, bones, tin, &c., are apt to become fixed here. The animal foams at the mouth, cannot feed, and loses flesh. A close examination should be made, and if there is a foreign body, remove it at once. When a horse is casting its front teeth, or nippers, the gums and bars, behind the upper teeth, usually become swollen. It does not feed well, and is said to have got *lampas*, or more commonly "*lampers*." Long ago, a lamper-iron used to be kept by blacksmiths. This was made red-hot, and the inflamed bars were burned; but it was a most unnecessary and cruel operation. The congested gums are only the natural effects of shedding the milk teeth. (*See Lecture on Teeth*).

3rd.—*The Soft Palate* (or fleshy curtain, which hangs behind the hard palate) is occasionally damaged, from various causes. For instance, it may get bruised when the animal is receiving a ball on the sharp end of a stick, and cause troublesome abscesses. Balls should never be given on sticks. *Use the hand*, failing which, a balling-gun, or a balling-iron, may be tried—*with care*.

4th.—*The Tongue*, which, in the horse, is much broader at the point or apex than in the cow, has important functions to perform, being the organ of taste, and also helping the animal to swallow, &c. It is a fine, delicate, muscular organ, well supplied with nerves, and extremely sensitive. It is very easily injured through ill-treatment

whilst being handled by ignorant people, when it is liable to become paralyzed, and mortify : or it may even be pulled out. The entire horse, "Pickpocket," had its tongue torn away while being given a ball. On two occasions, I had to cut about four inches off the end of the tongue, through its being damaged ; one being too much pulled on giving a ball, the other by putting on a twitch. In each case the member was partially paralyzed, of a black colour, and hanging between the incisor teeth. It was cut off at the line of demarcation, and did well ; afterwards, on drinking, both animals plunged their heads up to the eyes in water before they could suck any up. The tongue is also subject to swelling from other causes, turning black, the swelling resembling erysipelas ; this has a tendency to suffocate the animal, and *tracheotomy* has to be performed. It occasionally becomes hard, and indurated, and is frequently injured by sharp teeth. (*See Lecture on Teeth*).

A common cause of injury to the tongue and mouth is the administration of drugs—as turpentine and ammonia—in unsuitable vehicles.

Turpentine should be given in linseed oil, or, if oil is not handy, milk makes a good substitute. *Never give turpentine in cold water.*

Ammonia should be diluted with plenty of *cold* water.

The tongues of cattle, too, are often injured by thorns, pins, needles, bones, or broken teeth ; and are also affected by cancerous growths, as

Actinomycosis, supposed to be developed from a small vegetable organism. It usually attacks the thick part of the tongue of the cow. As the case progresses, the animal is noticed rolling that organ about, holding its nose slightly up when attempting to swallow, and seems to have great difficulty in getting the food passed between the molar teeth, or rolled about for mastication. Saliva flows freely from the mouth, the patient loses flesh rapidly, but, as a rule, is not hidebound ; while, on examining the mouth, the tongue is found very much enlarged, and hard in places, causing considerable loss of power.

Iodine is said to have a good effect on this complaint, but, from my experience, the sooner the beast is slaughtered, the better.

One peculiar case I had some little time ago, was a cow that was losing flesh very fast. Its lower jaw was constantly on the move, and the tongue was hanging partly out of the mouth, as if paralyzed, saliva flowing freely, and frothing round the lips, presenting all the symptoms of having something sticking amongst the teeth, or in the tongue; but examination showed this was not the case. At times it fed, but swallowed with great difficulty; never chewing the cud, and occasionally vomiting the food. I ordered it to be slaughtered, when a large darning-needle was found sticking in the passage between the second and third stomachs. The animal never swelled, nor had it any cough.

Young calves—more particularly shorthorns—five or six weeks after birth, occasionally suffer from small enlargements, resembling carbuncles, which form on the tongue and on the inside of the cheeks, terminating in ulcers, with thick granular matter at the bottom of them. This ought to be scooped out, and the wounds dressed with tincture of iron and water, while 30 grains of chlorate of potash may be given in the milk with advantage, night and morning. These are thought by many to be due to drinking hot milk. Occasionally the outside of the cheeks are enlarged, when a quantity of frothy saliva flows from the lips, and the little animal does badly. In these cases external application of iodine has good effect.

5th.—**The Pharynx**, or throat, is subject to injuries of many descriptions. For example, the horse may choke by some food sticking just at the top of the gullet; or pharyngitis may occur. This is sometimes the effect of some foreign body irritating the pharynx; at others, the accompaniment of a severe cold. When the throat becomes much congested and inflamed, the animal is unable to swallow, and, on it attempting to drink water, a portion is returned through the nostrils. If the inflammation is at all persistent, the chances are that the horse will ultimately become a “roarer.” In very severe cases, where the effusion, or œdema, has so swelled the inside of the throat that there is

a danger of asphyxia, *tracheotomy* has to be performed. This is done by cutting out a portion of two rings of the windpipe, in front, and inserting a tube, suitable to the size of the animal. Seven years ago, I had a very severe case, which had been under the care of an unqualified man, who treated it for influenza. On examination, I found a large thorn, composed of three branches, the middle one about ten inches long, and the two shorter ones each about seven inches in length, sticking in the throat. This I pulled out, after it had been there three weeks; but the animal eventually turned a "roarer," when I performed *tracheotomy*. The horse is still alive, and is wearing the tube, having done well ever since, working daily. Cattle—particularly shorthorns—suffer very much from scrofulous abscesses, or masses of matter, between the back of the throat and neck-bones—*post-pharyngeal abscesses*. These cause the animal to make a great noise—a kind of snoring—in its breathing, so much so, at times, that *tracheotomy* has to be performed, thus allowing it to respire freely, until the abscess is ready to open, which latter may be done through the mouth. As soon as the patient is better, it should be fattened right away, and sent to the butcher. Tumours, with long necks—*polypi*—are also found in the throat, producing somewhat similar symptoms to the abscesses just described, but they are readily removed by the hand.

6th.—**Choking.**—Some horses, which are greedy feeders—if *the corn is not carefully spread out on the bottom of the manger*—will take too big a mouthful, and choke themselves. In this case, all that can be reached by the hand must be removed, and the animal given a drench of warm water, or, better still, thin oatmeal gruel, which induces the action of the gullet. Cattle are more subject to choking than horses. They foam at the mouth, and soon begin to swell up on the left side, switch the tail, and stamp the feet. If the obstruction—usually a potato or turnip—can be felt, an attempt should be made to work the foreign substance up again into the mouth, by putting one arm round the cow's neck, and with the fingers on each side of the gullet, and below the offending body, press it firmly and forcibly into the mouth; but be careful of the cow's horns in the operation. If this method does not succeed, and the object cannot be withdrawn by the hand,

trocar and *canula* has to be passed in, on either side, between the last rib and haunch; on the *trocar* being removed, the gas escapes through the *canula*, giving instantaneous relief. This operation should be in the hands of a professional man.

Stomach Stagers in the Horse.—In hot, dry weather, more particularly on hilly ground, where there is the second year's growth of rye grass, the horse is sometimes attacked with this malady. As in cattle suffering from the same complaint, too early ripening of rye grass is supposed to be the cause. The horse has an unsteady gait, as if like to fall, first on one side, and then on the other, swinging its head backwards and forwards. If in the stable, it may be found with its nose pressed on the bottom of the manger, and forehead against the wall, or steadying itself, with the nose fixed between the bars of the hay-rack. The breathing is slow and laboured, and the pulse is full and slow. With its simple, single stomach, the horse, in these cases, is much better to treat than the cow. From four to six quarts of blood may be taken, to relieve the acute symptoms, which, with a four to six drachm dose of physic, usually sets matters right.

Bots.—Amongst horses in the country, the stomach is very often infested with these small grubs—the larvæ of a fly resembling the humble-bee, which deposits its eggs at hay and harvest time, in little yellow tenacious spots on the horse's fore-legs or shoulders. The eggs are hatched by the heat of the body, and this causes an itching sensation at the root of the particular hair to which each egg is attached; in consequence of this, the horse licks the parts, and the ova, thus gaining the mouth, pass into the stomach, and fasten themselves on to the cuticular portion (rarely the villous). It is only in the horse's stomach that these larvæ will develop, this being their proper winter *habitat*. Here then, the ova turn into larvæ, or grubs, which, when spring comes again, loosen their hold, pass away with the fœces, and fall upon the ground, when they turn into *chrysalides*, and, in due course of time, form the perfect fly—*Æstrus Equi*—ready to perform another circular tour.

There is no known remedy for bots. They seldom cause the death of a horse, as nature thickens the coats of the stomach, so that

STOMACH AND INTESTINES OF THE HORSE.

- A. Stomach of Horse laid open.
- B. B. Cuticular Portion.
- C. Villous or Digestive Part.



- D. Pyloric Opening.
- E. Duodenum.
- F. Biliary and Pancreatic Ducts, entering the Intestines.
- G. Small Intestines.

- H. Mesentery or Net.
- I. Caecum, Blind Gut, or Water Bag.
- K. K. Colon or Large Intestine.
- L. Rectum.

they cannot get through. Sometimes, however, in their passage through the intestines, they attach themselves to the lining membrane, and set up irritation, and inflammation, of the bowels, which may kill the horse. The best method for their removal is to give the animal some new grass, when the bots, if they are fully developed, seem to know that it is time to be going for their next transformation—that is, into *chrysalides* (For symptoms and treatment, see “Worms.”)

Crib-biting is not really a disease, but a form of indigestion, and more of a bad habit. The horse gets hold of the wooden side of the crib with its teeth, and fills the stomach with wind. This habit is often due, in the first instance, to idleness. The front portions of the incisors get gradually worn round, but this is also seen in horses that bite at the manger, or stall, on being groomed. The best remedy I know of, is to use the new iron fittings—made by Musgraves, Belfast—in which the front of the crib is of iron, and too broad for the horse to get hold of. Brick troughs, with a broad mould on the top; a strap round the neck; or feeding the animal from the ground, are useful, and worthy of a trial.

Windsucking in the horse is a similar complaint to crib-biting, and is also a bad habit. To test for windsucking, the following can be tried:—Put a handful of soft sugar into the animal’s mouth, and leave it for ten minutes or so. If a windsucker, you will generally find it standing with its nose elevated, its neck strangely arched, and making a peculiar and distinctly characteristic noise.

Crib-biting and windsucking are each considered an unsoundness.

Worms.—The intestines of the horse are frequently infested with large white, as well as with many other kinds of worms. The symptoms noticed are: staring coat; irregular appetite; dulness; languor; legs trailed on moving; belly tucked up, with occasional diarrhœa. Give one pint of linseed oil, with two ounces of turpentine, which can be repeated every sixth or seventh day, if necessary, till three doses are given; or, one ounce of flowers of sulphur, in a

bran mash, daily, for a week, may be useful. This latter treatment generates sulphuretted hydrogen gas in the intestinal track, which is very poisonous to the worms.

After very wet seasons, horses and cattle out at grass are likely to be especially affected with worms and parasites, which show their effects in early spring. November is, therefore, the proper time to treat such cases, before they get too well developed. An ounce of common salt should be given in a mash of oats and bran, once every day, both in the stable and at grass. The land on which the animal feeds should be dressed with a quantity of roughly-crushed rock salt, say 8 to 10 cwt. per acre. Not nearly enough salt is applied. Every year, the above quantity, at least, should be put on the grazing land, lea ground, and the meadows. This will not only check parasitic diseases in horses and cattle, but will also prevent many of the insect ravages and diseases of crops: as for example, anbury, or club-root, in turnips. But to do good, *a continued annual application is required.*

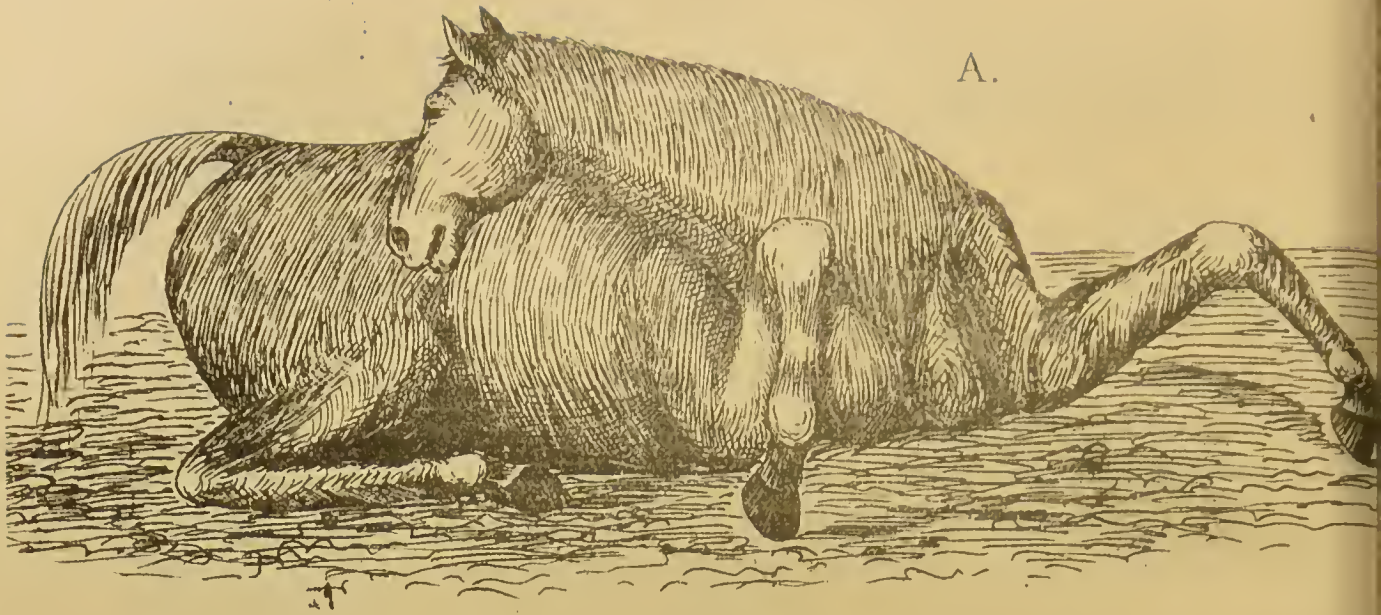
Ulceration of the Stomach is happily rare, and when it occurs there are no positive symptoms. The horse does not vomit in such cases as does a human being, but drops off its food; loses flesh, shows no pain, becomes hide bound, with a staring, dirty coat; is languid; and finally dies.

Indigestion is common both in horses and cattle, more particularly in the former, which are being fed up for shows or for the market, this often occurring from over-feeding. The horse shows no pain, but simply loses its appetite. For a remedy, give 3 drachms of Aloes, with 3 drachms of Bicarbonate of Soda, in the form of a ball, when, if the animal does not pick up, mineral and vegetable tonics may be resorted to. The best thing, however, is to let the animal find out its own. In one case which came under my care, the horse had given to it all sorts of medicine without any good effect, and finally selected for itself the young shoots of thorn trees, eating these with a great relish, whilst it would take no other food, unless mixed with these. They were evidently just the fillip the stomach was in need of; the tannic acid contained in the thorn, being the very thing nature

death is very sudden. The *post-mortem* reveals the lining of the stomach to be much paler than normal, without any signs of inflammation.

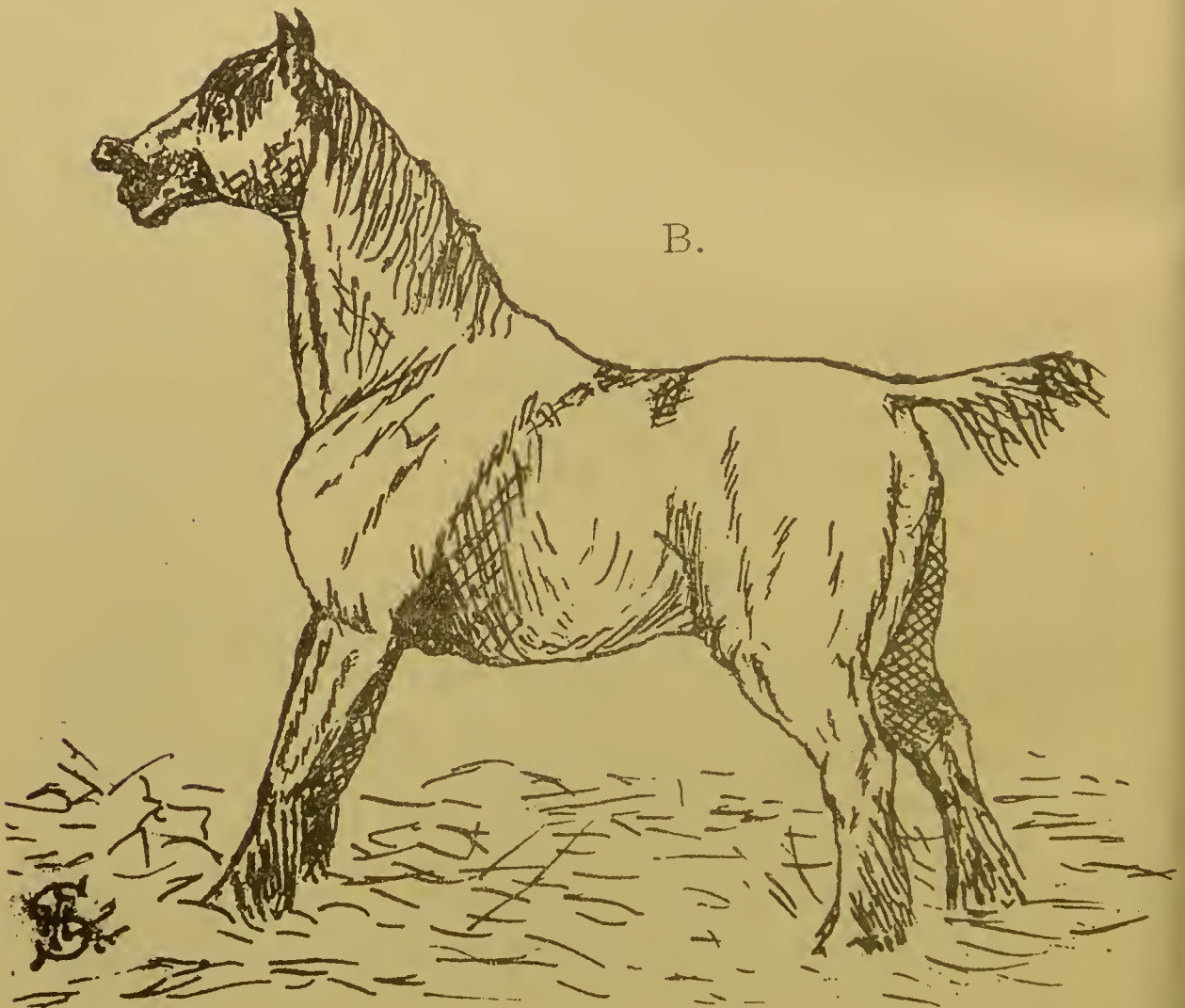
7th. **Colic** is of two kinds—**Spasmodic** and **Flatulent**. Spasmodic Colic is caused by spasm or cramp of the muscular coat of the intestines, more particularly the small ones. It arises from a variety of causes, such as drinking cold water when the animal is heated; worms; sudden chills, &c. When first attacked, the horse wriggles the body from side to side; sniffs the ground; paws with its fore feet; cringes on its hind legs; bends its knees, and then throws itself down; rolls about; balances itself on its back; perspires freely; and looks back at its side, and at times sits on its haunches like a dog. This may go on for a few minutes, or half an hour, when the pain leaves the animal for an interval, and it stands or lies perfectly quiet. In a short time, however, the pain returns again. No time must be lost in getting relief, as injury sometimes follows by the horse knocking itself about, or the spasm, if severe, may eventually terminate in a loop or knot in the bowel, from the excessive contraction of the longitudinal and circular muscular fibres of the intestine. From 2 to 4 ounces of laudanum, along with 2 ounces of turpentine, in a pint of linseed oil, may be given at once, and if no abatement is noticeable, repeat half the quantity of laudanum and oil in half an hour. Apply hot-water blankets, and give warm-water injections. Bleeding, to the extent of 6 to 8 quarts, has, in some cases, a very beneficial effect, but do not be too long in getting professional assistance.

Flatulent Colic is caused by the intestines becoming blown up by gas, generated from the fermentation of food, principally in the large intestines. The symptoms greatly resemble those of Spasmodic Colic, but, in addition, the animal is much swollen. If it is greatly pained, a similar draught to that described under Spasmodic Colic may be given, and tobacco injections thrown into the rectum. (Unroll from 8 to 10 inches of twist tobacco, and put in a quart of boiling water, strain, and when new-milk warm, give as an enema). If this does not give relief, veterinary aid should at



A.

A HORSE IN COLIC.—A.



B.

CASE OF OBSTRUCTION OF THE BOWELS FROM CALCULUS IN
LARGE COLON.—B.

once be summoned, when, possibly, the intestines may have to be punctured to allow the gas to escape. Sometimes 2 ounces of bi-carbonate of soda, in a pint of water, with half a pint of whisky, will be found to answer very well, when the animal is not much pained. Both Flatulent and Spasmodic Colic, if not attended to, may run on and terminate fatally, or in

Enteritis, or Inflammation of the Bowels, which, as a rule, is a very fatal disease in the horse, death frequently taking place in five or six hours.

The symptoms, at the onset, are much the same as those exhibited in colic, with this exception, *that in enteritis, there are no intervals of rest, the pain being continuous*. There is a peculiar dejected appearance, and an anxious expression on the animal's face; the nostrils are dilated, and very red inside, and excessive perspiration pervades the body, followed by cold, clammy sweats. At length, the pain disappears, the animal stands quietly, trembling, and *sighing heavily*; the pulse, which was at first full and bounding, now becomes small, weak, and scarcely perceptible, when the patient finally drops and dies.

Numerous lesions of the horse's bowels occur, such as large clots of blood found between the outer and inner walls of the intestines, the symptoms of which are of a sub-acute nature; *Loops* or *Knots* are also met with. In these cases, a rent has been made in the mesentery, or net—generally caused by the horse rolling and tossing about in colic—and through this a portion of the small intestine is pushed, becoming *strangulated*, and filled with dark, congested bloody fluid. In such cases, the expression of pain is something terrible to behold, the animal being dangerous to go near. Again, we have *Twists* occurring, where one portion of the bowel gets rolled over another; but the pain here is not quite so violent as in *Loops*.

Occasionally, through the presence of worms or spasm, a part of the small intestine becomes telescoped, that is, drawn inside the neighbouring part. I have a specimen invaginated to the extent of 23 inches. Here again, the pain, though acute, is not nearly so severe as in *Loops*.

Tumours are sometimes formed in the mesentery, with a long neck, which gets twisted round a part of the small intestines, strangulating them. All these are accompanied, as I have said, with more or less severe colicky pains, and, as a rule, terminate fatally.

For a number of years, I have noticed in these lesions of the intestines, that about an hour before death the animal commences to walk round and round incessantly, until it drops and dies, which symptoms I have not seen in inflammation of the stomachs, or bowels, although large quantities of opiates have been given.

8th. **Large Intestines.**—I have frequently met with cases of *congestive inflammation* of the lining membrane of the large colon, in which the walls of the intestine become intensely thick, and jelly-like. These cases, in my opinion, much resemble **Weed** (**Lymphangitis**), in the fore or hind legs, and may be induced by giving a horse affected with weed a large dose of aloes, acting too strongly on the alimentary canal, and causing the disease to shift from the leg to the bowels. I make it a rule, in very acute cases of *weed*, to use aloes very sparingly, and then only in solution, and combined with linseed oil.

The large intestine may, however, be attacked with this inflammatory action primarily, and without Weed being present; active treatment must be adopted—sedative medicine, such as opium, hypodermic injection of morphia, with hot blankets round the body.

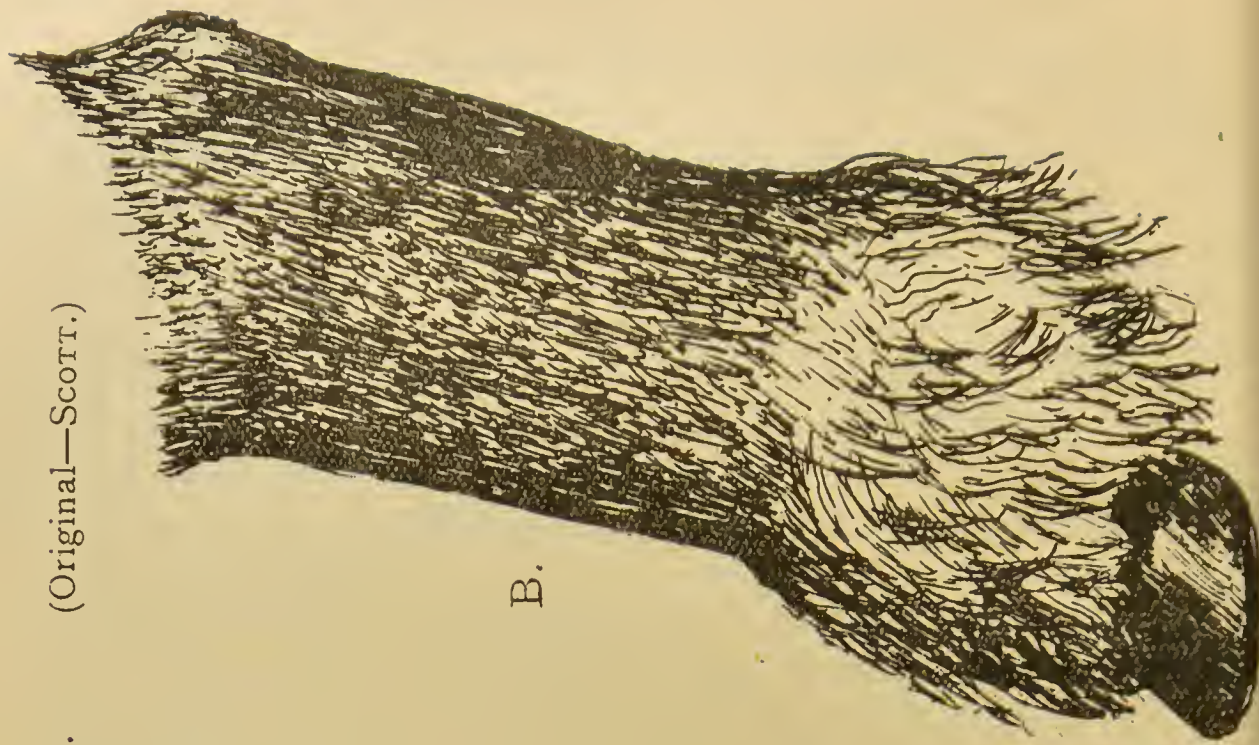
Concretions, or Calculi, occur in the large intestines, and, occasionally are of a great size. They are composed of dust, and phosphate of ammonia, magnesia, or lime; some are hard as a stone, and very smooth; others are soft and convoluted. Millers' horses are most subject to these. As long as the calculi remain quiet in the pouches, or part of the intestines in which they were formed, no ill effects are seen; it is only when displaced, that they produce pain, and usually death. The symptoms exhibited resemble those of knots, twists, &c., but are not nearly so acute. As a rule, *in all cases of bowel displacement and obstruction, from calculi, the animal cannot keep injections, nor drink water*; in fact, it strains very much when enemas are given.

PLATE XVII.

(Original—Scott.)



TELESCOPIC GUT, 23 INCHES LONG.—A.



ELEPHANTIASIS.—B.

The following is an analysis of a calculus—one of six—passed by my own cob, “Quicksilver,” and analysed by Prof. Sibson, London:—

Moisture	..	..	..	..	..	15'24
Fatty Matter	..	..	..	..	..	traces
* Animal Matter	..	..	..	..	..	31'50
* Ammonia, Magnesia, Phosphate			..	..	..	52'16
Lime	..	..	..	..	..	traces
Alkaline Salts	..	..	..	..	..	'81
Silica	..	..	..	..	..	'29
						<hr/> 100'00 <hr/>
* Containing Nitrogen, from Animal Matter and Combined Ammonia						5'10
Equal to Ammonia	..	..	..	..	..	6'19
Specific Gravity	..	..	..	..	..	1'71

March 2nd, 1894.

The cob has been in my possession ten years, and is seventeen years old, full of fire, with plenty of “stamp, style, and fashion.” It has never shown any symptoms of pain, nor ever been off its food.

When in the stable, prior to passing the Calculi, I frequently found the animal standing in an oblique fashion in the stall, with its near hind leg forward, and the front of the off hind leg stretched across the back of the near shank, the toe of the off hind foot constantly in motion, until the stone into which the masterpost of the partition was fixed, as well as the oak-sword, or plate, at the bottom of the partition, were worn away.

All the balls were passed within fourteen days, being found among the fœces. The largest one is $6\frac{1}{2}$ inches in circumference, very smooth, and quite round.

The cob has never had any medicine.

Calculi are of three kinds, viz.:—*Phosphatic*, *Oathair*, and *Mixed*. The Phosphatic are those described above; the Oathair, very large, and oblong in shape, are made up almost entirely of the beard of grain, are much convoluted, and are known as the “Mulberry”; whilst the Mixed partake of the nature of both the foregoing, but are of various shapes and sizes, and only slightly convoluted.

Constipation is due to the large bowel becoming impacted with food, when the intestine loses tone. We may have it with or without flatulence. Slight colicky pains are exhibited; the animal lies down, and may remain quiet for three or four hours, occasionally screwing itself on its belly, getting up, stretching, and standing with the hind legs well backwards, taking a bite of food now and again, when the spasm of pain returns. A draught of from 3 to 5 drachms of aloes (according to the animal's size), in solution, with one pint of linseed oil, is the best remedy. This should be accompanied by warm water injections given every two hours.

In all cases of bowel complication, the symptoms at the onset are very much alike, and the great point is to get the animal relieved from pain as soon as possible, by administering sedatives, such as opium, chlorodyne, chloral, or, best of all, hypodermic injections of morphine and atropine.

I have found the following to answer admirably:—Carbonate ammonia, chloral hydrate, 4 drachms each; carbolic acid (B.P.), 30 drops; mix, and make into a ball, with the aid of linseed meal, and administer every four or six hours, if necessary.

Hernia, or Rupture, takes place at various points, as, for instance, the diaphragm may be ruptured, and a portion of the intestines be pushed through into the chest, generally terminating fatally. Or, again, the "belly-rind" may become broken, and the intestines escape into the skin. In this case, sew a bandage tightly round the body, to support the bowels, until the rupture is reduced.

Scrotal Hernia is very common in young foals; but, in 95 per cent. of the cases, the bowel returns to its proper place before the animal is twelve months old. Another very common hernia is that of the navel—*umbilical hernia*, as it is called. The best remedy for this is to apply a special truss, when the foal is first taken from its mother; or it may be reduced by an operation.

The Rectum.—I have seen a number of cases where this intestine was damaged by a stick, or other foreign body, being passed up by malicious individuals, when troublesome abscesses form, causing great swelling and straining. The principal injury, however, is

found in the mare, when, in being delivered, the foal's foot is pushed through the roof of the vagina into the rectum, resulting in a troublesome fistula; or the rectum and vagina may be torn into one. In these cases there is, as a rule, extensive inflammation and sloughing of the parts. Occasionally we meet with cases of **Eversion of the Rectum**, caused by impaction through some error of feeding. When, on attempting to pass the fœces, the rectum becomes turned out, it must be well washed in tepid water and replaced at once, whilst warm water injections should be given three or four times a day, dieting the animal on soft food, such as bran mashes, &c. When neglected, it mortifies, becomes black, and has to be cut off, which is rather a formidable operation.

Pigs and **Dogs** are most subject to this rectal eversion, more particularly the latter, when the rectum becomes impacted with quantities of crushed indigestible bones, which are matted together, causing great pain and straining, and must be removed by water enemas and glycerine.

Calves, **Lambs**, and **Pigs** are occasionally born with an **Imperforate Anus**, the end of the bowel being covered or blinded. It is very easy to cut through into the canal with a sharp knife, when the animal generally does well.



SIXTH LECTURE.

DIGESTIVE ORGANS (B).

THE organs of digestion in the cow, prior to the stomach, present few differences from those of the horse. Certainly, the mouth does contain distinctions ; for whereas that of the horse has incisor teeth in both upper and lower jaws—six in each—the cow possesses them in the lower jaw only ; they are eight in number, and their place in the upper one is taken by a fibro-cartilaginous pad. The tongue, too, is of a different shape, being short and pointed, and, instead of having a smooth surface, it is extremely roughened by little eminences, and it is the prehensile agent. The soft palate, though present, is much modified. When we come to the stomach, however, we encounter wide differences. The cow has four stomachs, or, to be more precise, a stomach divided into four compartments.

The 1st is the *Rumen, or Paunch*.

The 2nd is the *Reticulum, or Honeycomb*.

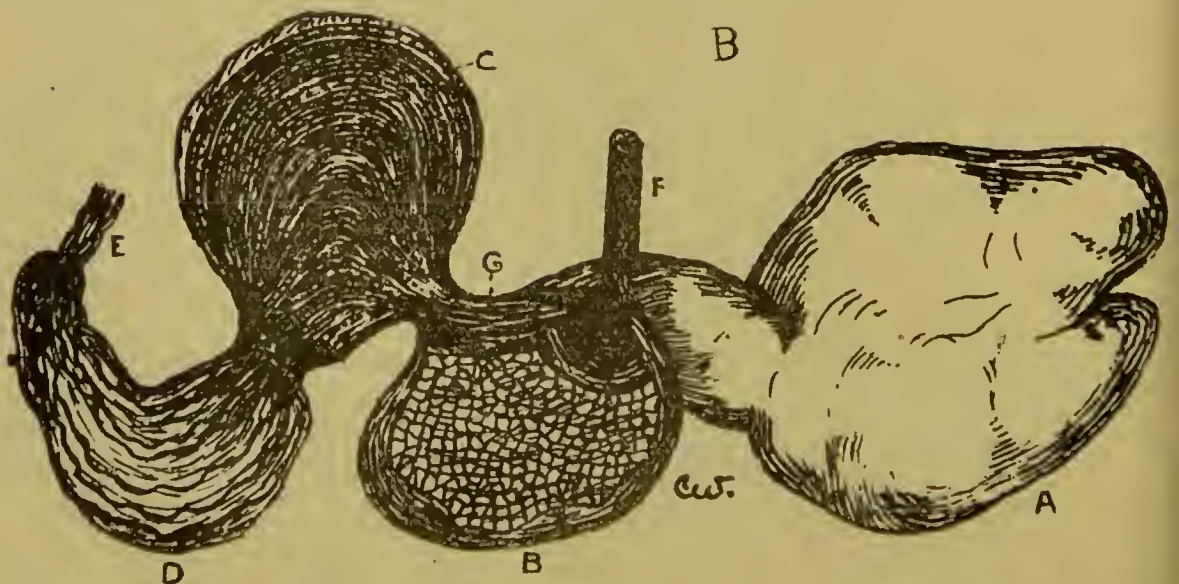
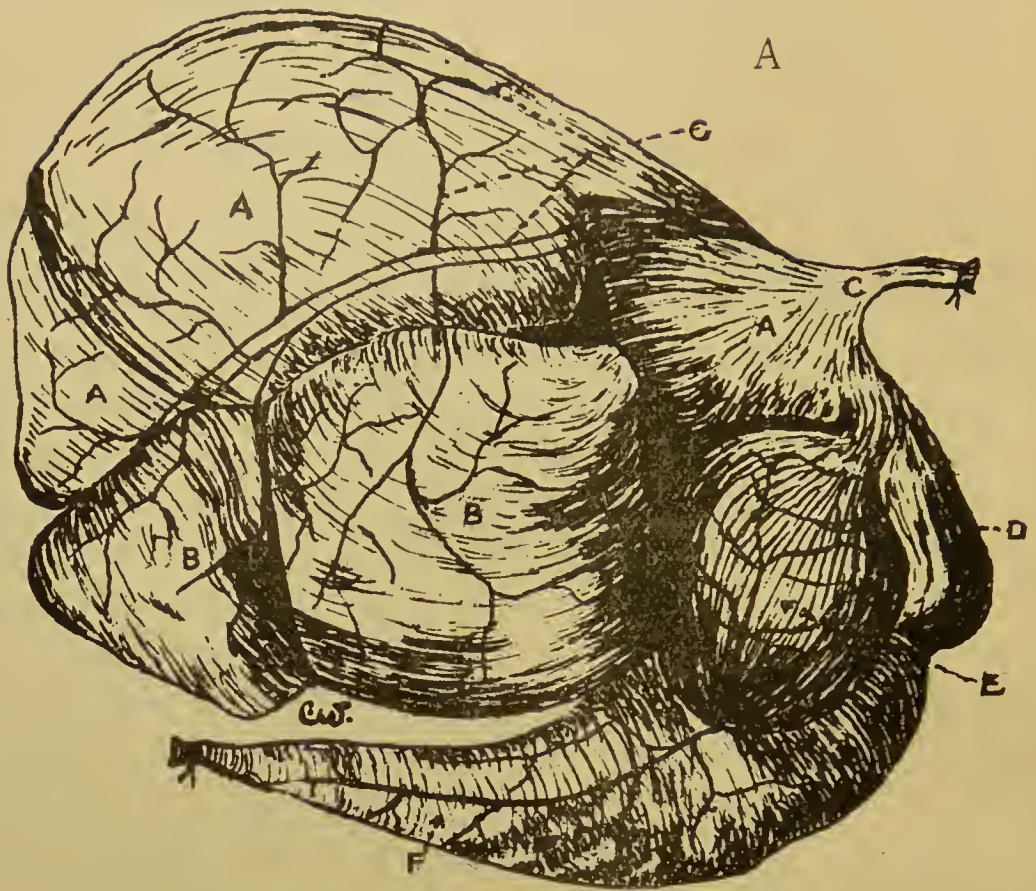
The 3rd is the *Omasum, or Manyplies*.

The 4th is the *Abomasum and True Digestive Stomach*.

The first, second, and third stomachs are merely compartments for storing and preparing the food for digestion by the fourth.

The First, which lies on the left side, is largest, and, in the adult animal, occupies about three-quarters of the whole abdominal cavity ; it has strong muscular bands running on the walls, in various directions, to assist and control its actions. It is very strong, and is lined with cuticular membrane, which is studded all over with little projections, or papillæ.

The Second, which is the least, is also lined with cuticular membrane, pitted all over with little cells, giving it a resemblance to honeycomb. This stomach acts as a sort of sifting machine, as



EXPLANATION OF PLATE XVIII.

THE STOMACHS OF THE COW.—A.

- A. A. A. The First Stomach, Rumen, or Paunch.
- B. B. The right-half of the Rumen or Paunch.
- C. The Œsophagus or Gullet.
- D. The Second Stomach, Reticulum, or Honeycomb.
- E. The Third Stomach, Omasum, or Manyplies.
- F. The True Stomach, Fourth, or Abomasum.
- G. The Arteries which supply the Stomach.

STOMACHS OF THE COW.--B.

- A. The First Stomach, Rumen, or Paunch.
- B. The Second Stomach, Reticulum, or Honeycomb, laid open.
- C. The Third Stomach, Omasum, or Manyplies, laid open.
- D. The Fourth, Abomasum, or True Stomach, laid open.
- E. The Pyloric Orifice.
- F. The Œsophagus or Gullet.
- G. The Œsophageal Canal.

it we find sand, stones, nails, pins, needles, and all sorts of foreign bodies—sifted out of the food before being sent to the third stomach.

The Third has its lining membrane arranged in a peculiar manner, forming a large number of leaves, or folds, hence its name, *masum*—manyfolds, or manyplies. The leaves run lengthwise, and extend from one end to the other, one border being free, while the other is attached to the wall of the stomach. Between the large leaves there are smaller ones, all being covered with small projections, or apillæ. The function of this stomach is to press and saturate the food before it passes into the

Fourth ; this is the true digestive stomach, and in the calf it is much the largest. The interior presents large folds, running lengthwise over its surface—mucous membrane—which is soft, velvety, and of a pale pink hue. Here the food is chemically acted upon, as described on page 69.

Rumination, or Chewing the Cud.—This process consists of returning the coarsely masticated food, stored in the *Rumen*, back into the mouth, to be re-masticated and properly mixed with saliva. Some portions of the food are returned several times, whilst others only require one chewing. My view of rumination differs considerably from that of some other professional men, and is as follows :—

The cow fills the paunch with food of various kinds, principally of a bulky nature, taking little or no trouble to masticate it. Then, when the animal has had its fill, it rests and commences to chew the cud. Small pellets, or boluses, are formed by the churning motion of the rumen. These pellets are then passed to the second stomach, where the fine portions are sifted out, and carried at once to the third stomach, while the rough portions are thrown up the gullet, into the mouth, to be properly chewed and salivated. This process over, it is again swallowed, and sent back into the paunch ; thus, some of it must be re-masticated several times.

Foreign bodies, such as sand, nails, &c., are, as already mentioned, left in the second stomach. My idea of this process originated many years ago, on performing Rumensotomy—that is,

cutting into the stomach, and removing its contents. There is no other of the compartments, than the rumen, large enough to hold all the cud that a cow chews at once, and the second stomach, which is said by some to be the water-bag, is so small that it would not hold a tenth part of the quantity of water which a cow drinks at a time.



DERANGEMENTS AND DISEASES OF THE ALIMENTARY CANAL.

While in the horse, the large intestines are the organs most frequently affected ; cattle suffer principally from derangements and diseases of the stomachs.

Hoven, or Tympanitis.—This, consisting of distension of the rumen with gases, is of very frequent occurrence. The causes are many, as choking with a potato or piece of turnip. Its treatment is described on page 74. Fermentation of food is another common cause, and nothing is worse for this than an over-feed of potatoes, followed by a hearty drink of cold water. A cow that has unfortunately gained access to a potato heap, and had a good feed, should not be allowed any water for three or four days. It should be fed on small quantities of rough straw, as distension from this cause is extremely dangerous, the contents being of a yeasty character. The tympany may also be caused by wet grass, frosted, or snow water, or frosted turnips. In these cases, a pint of linseed oil, with two ounces of turpentine, generally has a good effect.

When the animal picks up foreign bodies, such as stones, bones, leather, wood, &c., or has tumours, abscesses, or hair balls in its stomach, there are periodical swellings about every five or six hours. These are very difficult to treat. Tablespoonful doses of *chloride of lime*, in milk, or 2 ounces hypo-sulphite of soda, in water, have very good effects.

Sometimes the stomach becomes blown up from rupture, stricture or dilatation of the gullet, or from a rent in the rumen. In these cases, the sooner professional advice is got, the better for the animal, and the owner as well.

Impaction of the Rumen.—*Plenalvia.*—*Grain Sickness.*—This occurs in stall-fed animals, more particularly, if they have had an excess of dry food, such as meals (of doubtful quality), or frosted turnips. The walls of the stomach become paralyzed, and their actions are suspended. Sometimes there is gas present, and the

left side of the animal is seen to be distended. On pressing the fingers into the flank, between the last rib and haunch-bone, the stomach is felt to be full and hard, and at times slightly "drummy." The animal stands perfectly still, emitting a peculiar "*grank*," or "*grunt*." The head is extended, nose slightly lowered, and back arched, while there is a thoughtful expression on the face. The pulse may, or may not, be disturbed, but I have never seen any indication of colicky pains, as described by some. The appetite is entirely gone, and rumination is suspended; while in the milch cow, the secretion is stopped. There is generally slight diarrhœa at the onset, but this soon stops, and then no fœces are passed for some days. If gas is present, linseed oil and turpentine should be given first, followed up in an hour or so by 1 pound to $1\frac{1}{4}$ pounds Epsom salts, with 2 ounces powdered ginger, sweet peppers, &c. These should be given in a quart of thin gruel, with another pint of oil. Owing to the paralytic condition of the walls of the stomach, these cases are frequently very difficult to manage, requiring time and patience. A great deal of harm is often done by overdosing the animal with sickly purgatives, when stimulating tonics and cordials are more required.

After all medicines have failed in this complaint, I have had the greatest successes with an old-fashioned remedy, namely, 3 to $3\frac{1}{2}$ pounds of fat bacon, cut up into small pieces, boiled for two or three hours in water, and with the addition of 6 ounces of salt, mixed with a quart of milk. This must be put in with a horn—as indeed ought all cattle drenches (*see page 14*); and a few gallons, or so, of bran or hay tea should be placed for the animal to drink. I have rarely seen this mixture fail in having the desired effect, where no organic lesion was present.

When the rumen has become very much impacted by the animal getting loose in the byre, and gorging itself with corn, &c., medicine has little or no effect. Good results are sometimes had by cutting into the stomach, on the left side, making an opening about six or eight inches long, and emptying the rumen with the hand. This operation is called *Rumenotomy*.

Vomition or Vomiting, while not of frequent occurrence in either, is oftener found in the cow than the horse. It has been said that the horse cannot vomit; but I have seen this occur, at least, on three occasions, when the animal dropped on its knees, pressed its nose on the ground, with side movements of the head, and food came out of both nostrils and mouth.

At times, the feeding-trough, in front of the cow, is found full of vomited matter. This departure is generally due to foods containing an excess of starchy matter, as potatoes; from chronic disease of the stomach; or, from obstruction of the small intestines. Ounce doses of bi-carbonate or hyposulphite of soda, with half-a-pint of whisky, in water, three or four times a day, can be recommended, with linseed jelly, or skim-milk, containing half-pint doses of lime water, to drink.

The Second Stomach.—There are no set symptoms to indicate any derangement of this compartment. As already stated, it is a receptacle for all kinds of foreign bodies—some of which occasionally pass through its wall, thence through the diaphragm to the lungs and heart. (*See Lecture on Circulation.*)

Indigestion, or Impaction of the Third Stomach.—**Fardel Bound.**—Cattle, when hard fed in stalls, or in spring, getting a chill at grass, frequently suffer from indigestion. Here rumination, the action of the bowels, and the secretion of milk, are suspended. The animal stands in an extremely stiff and listless fashion, emitting a *continuous grunt*, with grinding of the teeth, while on pressure being applied to the spine, behind the shoulders, it is like to fall on its knees, uttering painful groans. The function of the manyfolds being stopped, the leaves of the organ become partially paralyzed from impaction of the food. Any of the causes affecting the rumen may occasion derangement of this pouch, and a somewhat similar treatment must be adopted. Small doses of purgative medicine, with cordials, and a little linseed oil, or castor oil, may be given, with advantage, every six or eight hours, following up this treatment by offering small quantities of rough oat-sheaf, dry hay, cabbage leaves, &c., to solicit the action of the stomach.

Occasionally foreign bodies, such as stones, nails, &c., find their way through the opening into this stomach, and stick there. I remember one case, in which a flat stone got tightly fixed in the entrance: the animal had a continuous dry, barking cough, held its head and nose straight out, and would not touch food or water. I ordered it to be slaughtered, and found the stone as named. The cough was reflex, caused by pressure on a branch of the Par-Vagus nerve. In another case, five stones, a penny piece, and a nail were the instruments of obstruction. While in a third, a salmon fish-hook was fixed through three of the leaves.

The Fourth, or Digestive Stomach, suffers most from inflammation, caused by strong acids—mineral, alkaline, or fungoid poisons.

As already stated, the first three stomachs, being merely preparatory to, and sifting machines for, the fourth, are lined by cuticular membrane, so that poisonous materials rarely have much effect on them; but when the poison reaches the fourth, with its fine velvety, mucous membrane, and digestive function, it soon establishes its action. I have known arsenic to have been taken by cattle, which showed no ill effect till the fourth and up to the eighth day, when the poisonous action set in, killing them in from four to six hours. The abdominal pain, perspiration, and excitement, were something frightful to see; the animals became quite frantic, dropped, and died suddenly.

The *post-mortem* appearances greatly resemble those exhibited in the horse. (See page 79).

Small worms often infest the lining membrane of this stomach, causing exhaustion, diarrhœa, and extreme emaciation. This is particularly the case in young animals, in cold, wet seasons.

Drinking water from streams, wherein coal wash has been discharged, is said to have an injurious effect on this stomach, causing great emaciation, hide-bound, diarrhœa, and, eventually, death. I have been engaged in several litigations relative to this, and must say that I have never yet found any injurious effects from drinking the black coal water; but should the washed material from the sides of the burning refuse banks adjoining the coal pit—charged, as it is,

with free sulphuric acid, and sulphate of iron—get into a stream, and animals be allowed to drink this water for any length of time, chronic inflammation of this stomach, and of the bowels, with great emaciation and diarrhœa, is the result, followed by death, from inanition.

Stomach Staggers is most frequently seen in the summer months, more particularly in dry seasons, and where cattle are grazed on hilly pastures, or second year's crop of seed grass; it is not nearly so rife on old-laid pastures. It is thought to be caused by the rye-grass aborting, or seeding prematurely, but an overfeed of green rye corn will cause the identical symptoms. No doubt, the heat of the sun, and the dryness of the grass, in the first case, have much to do with it; while in the second, some peculiar chemical action seems to take place just when the rye is blooming, as it is at this time that the effects are worst. The animal suddenly drops off its milk; stops feeding and chewing the cud; the hair looks dingy and on end; the sides appear flat, the belly tucked up, and the animal is very listless. This goes on for 36 or 48 hours, when the pupil of the eye is noticed to be dilated, and the eye has a starry appearance; the breathing is slow and heavy, and the animal stands over on its fetlocks. At the commencement, there is slight diarrhœa, followed by considerable constipation, due to the want of nervous energy in the stomachs and bowels. If large doses of purgative medicine have been given, there may be a watery discharge from the bowels, but no fœces. At this stage, the animal begins to press its head against the wall, and snores loudly; or, when let out, seems quite blind, rushing forward, and tumbling over any object which may be in the way.

Lead-poisoning produces somewhat similar symptoms, but, instead of excitement, we have *coma*, with paralysis, and the appearances resemble those of *milk fever*.

Treatment, in the first stages, should consist of linseed oil, in from 10 to 15 ounce doses, every six or eight hours, and small doses of spirit, such as a teacupful of whisky, should be given at similar periods; plenty of boiled gruel, linseed jelly, and bran, or hay tea should be offered the animal to drink, the object being to get some food into the stomach, to neutralize, or, at least, modify, the

action of that which is causing the complaint. Once the animal begins to press its head against the wall, the best plan is to send for the butcher.

The arrangement of the intestines of cattle is quite different to that of the horse, as they are much smaller, but a great deal longer. On account of their less excitable or asthenic temperament, as already said, cattle do not suffer so much as horses from bowel complaints. Occasionally we have *spasmodic colic*, manifested by the animal kicking at the belly, lying down and getting up frequently, and switching and twisting the tail. These cases are sometimes readily enough relieved, but, at others, may go on for some days. From 10 to 20 ounces of linseed oil should be given, with 2 ounces of veterinary chlorodyne.

Inflammation of the bowels in cattle is happily very rare, except from poisonous matters.

Gut-tie is more common, but, unlike horses, cattle bear this very patiently, lingering on for six or seven days where it would only take a like number of hours for a horse to fight itself to death. Gut-tie is due to some false membrane forming in the abdominal cavity, and getting attached to, or encircling, some part of the intestines. It is mostly found in young bullock-stirks, yet I have seen three cases in young heifers. The animal stops feeding, twists the hind quarters and tail, crosses one leg over the other, and occasionally passes a small quantity of bloody mucus, with pain. If let out, it has a great tendency to walk backwards, and, if near a bank, will back its hind legs on to the top, and stand with its fore feet in the ditch: this appears to give great relief. It is dangerous to give large doses of purgative medicine. Small doses (5 to 8 ounces) of linseed oil, with chlorodyne, may be given to keep the animal quiet; the remedy recommended is to cut into the right flank, find the cord, and divide it, if possible. In one case of a bullock, I passed my hand as far up the rectum as possible, and, when working along, felt a cord outside the bowel. I gave it three gentle pulls, when it broke; the animal got immediate relief, and did well.

While injections are very serviceable in bowel complaints in the horse, they are of little or no use in cattle. Before going any further,

I must use a word of caution, that is, never horn gruel into an animal recovering from an illness, as is too frequently done. If it will drink gruel, milk, or cold water, give, and entice it to eat with all sorts of tit-bits of food—oat-sheaf for preference, wheat, or barley-straw, so as to induce the cud, which the horning in of nutriment is the very best thing to prevent.

Diarrhœa, or Scour, is a very common complaint in cattle, and is due to a variety of causes, such as frosted turnips, coarse, indigestible grasses, liver flukes, wet grasses, and scrofula, or tuberculosis. Young cattle, rising two years old, suffer most, in which case the common cause is turning them out in wet autumns, or on to oat-stubble, where the oats have been shaken and germinated on the ground. These corn growths are very dangerous both to young cattle and sheep, and should be avoided.

The crowns, or shells, of the temporary teeth not coming off at their proper time is another great inducement to diarrhœa in young stock. The mouth should be examined, and the shells removed. (*See Teeth.*)

Worms in the stomach and flukes in the liver constitute other chief causes; these happen through animals being turned out on to strong, wet lands in summer and autumn.

Cirrhosis, or hardening of the liver, is often the means of producing scour. So, seeing that there is such a multitude of causes, it is of the greatest importance to the owner, as well as to the veterinary surgeon, to find *the cause*, and treat accordingly.

Upon no consideration should diarrhœa be stopped suddenly, as it may be due to some hidden ailment, which nature is trying to relieve in her own way. Small doses of linseed oil, with chlorodyne and aromatic spirits of ammonia, may therefore be used in the first stages with great advantage, following up with vegetable and alkaline tonics; while, at times, the preparations of iron are useful. Good nutritious food, of an easily digestible character, should be given, such as crushed oats, bran, and linseed cake, milk, and linseed jelly; and, upon no consideration, should a small quantity of salt be omitted from the food at each end of the day.

Where the affection is attributable to worms or flukes, small and repeated doses of oil and turpentine may be administered with great advantage, and the lands should be dressed with salt, as the

Liver Fluke is a frequent and fatal producer of diarrhœa, both in young cattle and sheep, and as this is often the cause of a great amount of troublesome litigation amongst neighbours, a sketch of its character may not be out of place here.

The Liver Fluke, or *Distomum Hepaticum*, is of the order *Trematoda*, or flat suckorial worms. It has a very interesting history, passing through seven stages, between fluke and fluke, six of which are accomplished outside the body of the sheep, or host. See diagram showing the various stages through which it passes.

The flukes are bi-sexual, having both male and female organs in one body, and are generated from little eggs. These eggs are developed inside the parent fluke in the bile ducts of the liver, and are ejected from the fluke by one of the openings, and carried by the bile to the intestines, and eventually deposited on the ground in the droppings. As many as 200 flukes have been counted in one liver, whilst the number of eggs generated by these has been reckoned at 7,400,000, or about 40,000 to each fluke. The eggs are about $\frac{1}{180}$ of an inch long, and $\frac{1}{300}$ of an inch broad.

Mr. A. P. Thomas' summary of the life history is as follows:—

"The adult fluke, in the liver of the sheep, produces enormous numbers of eggs, which are distributed with the droppings of the sheep. If these eggs have moisture, and a suitable degree of warmth, they continue to live, and in each is formed an *embryo*. The embryo leaves the egg, and swims in search of the particular snail, '*Limnæus truncatulus*,' within which its future life and growth take place. The embryo bores into the snail, and then grows into the form which is called a *sporocyst*. The *sporocyst* gives rise to the second generation. This is known as *redia*. The *redia*, in turn, produce the third generation, which has the form of a tadpole, and is called *cercaria*. The *cercariæ* quit the snail, and enclose themselves in envelopes, or *cysts*, which are attached to the grass. When the grass to which the *cysts* adhere is eaten by the sheep, or other suitable host, the young liver fluke comes out of the *cyst* and takes up its abode in the liver of its host, and the fatal circle is thus completed. It will be seen, therefore, that the fluke disease is one which alternates between a particular snail and the sheep. A sheep cannot take the infection *directly* from another sheep, nor can one snail take it *directly* from another snail. The sheep, by spreading the eggs of the fluke, gives infection to the snail, and the snail, in turn, by harbouring and distributing the *cercariæ*, conveys the infection to the sheep.



A. The Egg of the Liver Fluke.

1. The Lid or Cap.

B. The Egg of the Fluke, containing an Embryo ready for hatching.

1. The Cap or Lid.

C. The Ciliated Embryo of the Fluke boring into a Snail.

D. A young Sporocyst dividing into two.

E. A fully-developed Sporocyst. showing a young Redia.

1. The young Redia.

F. A Redia, showing Mouth and Stomach.

The conditions necessary for the existence of liver-rot, in any given locality, are as follows;—

- 1.—There must be fluke eggs on the ground.
- 2.—There must be wet ground, or water, during the warmer weather, for the eggs to hatch in.
- 3.—A particular snail, called '*Limnæus truncatulus*,' must be present.
- 4.—Sheep, or other animals, must be allowed to feed on the same ground, without proper precautions being taken.

If any one of these conditions remains unsatisfied, there can be no fluke-disease or liver-rot in the locality.

If the eggs of the liver fluke are to be hatched, they must be in water, or; at least, be kept moist, during some weeks of warm weather, or even some months, if the temperature be lower. If the eggs are once thoroughly dried, their vitality is destroyed, the side of the shell being usually crushed in. A temperature of about 74° to 78° Fahr. is the most favourable, and then the embryo is formed in about two or three weeks; with less warmth, progress is slower, and with an average temperature of 60° the growth occupies two or three months.

Ground is often, with reference to the 'rot,' spoken of as '*sound*,' or, on the contrary, as '*rotting*.' When the droppings, containing fluke eggs, fall on to a field, the rain will distribute the eggs over the surface, washing them down to the roots of the grass. If the soil be light or sandy, and porous, the land will be '*sound*,' for the water will filter into the earth, leaving the eggs on the surface, where they will get dried, and so be destroyed. If, on the other hand, the soil is heavy and clayey, so that the rain-water does not sink into the ground, but flows along the surface, the ground is '*rotting*.' For, as the water flows over the surface, it carries the fluke-eggs along with it, and deposits them in ditches, holes, marshy places, or furrows, where the water stands—all of them provinces where the eggs will hatch. The obvious remedy for this evil is to drain the land thoroughly and efficiently, and it will not only do much to prevent the rot, but will have the further advantage of greatly improving the herbage. Where it is not practicable to adopt this remedy at once, either salt or lime may be scattered over its surface with advantage. Both these substances destroy the embryos of the fluke, and, at a later period, the *cysts*, when attached to the grass. And, still further, they will destroy the snails, which serve as hosts to the intermediate stages of the liver fluke. The freedom from rot of sheep which are feeding on salt marshes is well known, and is now shown to be due to the poisonous action of the salt on the embryos, *sporocyst*, *redia*, *cercaria*, and *cyst*, and to its similar action on '*Limnæus truncatulus*' itself. Even a weak solution of salt and water ($\frac{3}{4}$ per cent. of salt) proves fatal to this snail. Dressings of salt have the advantage over lime in not spoiling the grass for immediate use, whereas the latter will do so. It may, however, be better at times for the land itself that lime should be applied.

There seems to be only this one snail in England which can serve as a host to the intermediate forms of the liver fluke. Consequently, wherever this snail is absent, there can be no liver rot; and if we could succeed in exterminating it, we should render it impossible for the disease to exist in England.

It is naturally of much importance that salt or lime should be distributed at the right time of the year, when fluke germs and snails are present in the greatest numbers. The snail buries itself in mud or soil in the winter time, and, owing to the cold, no embryos are hatched at that period.

If the weather be warm in April, it is possible that a few may be brought out towards the end of the month, but they will not be numerous. In May, however, greater numbers may be hatched, and still more in June and July. These two months are the time of the year when the country is most liable to be infested by snails. As more eggs are distributed through the whole of the summer by fluked animals, it is clear, of course, that the production of embryos, though in less numbers, will continue from August until the time when the development is checked by autumnal cold. June and July, then, are the principal, but not the only, months in which we are to wage war against the embryos; the latter part of August September, and October, are the months in which, especially, to destroy the germs on the grass ready for transference to the sheep."

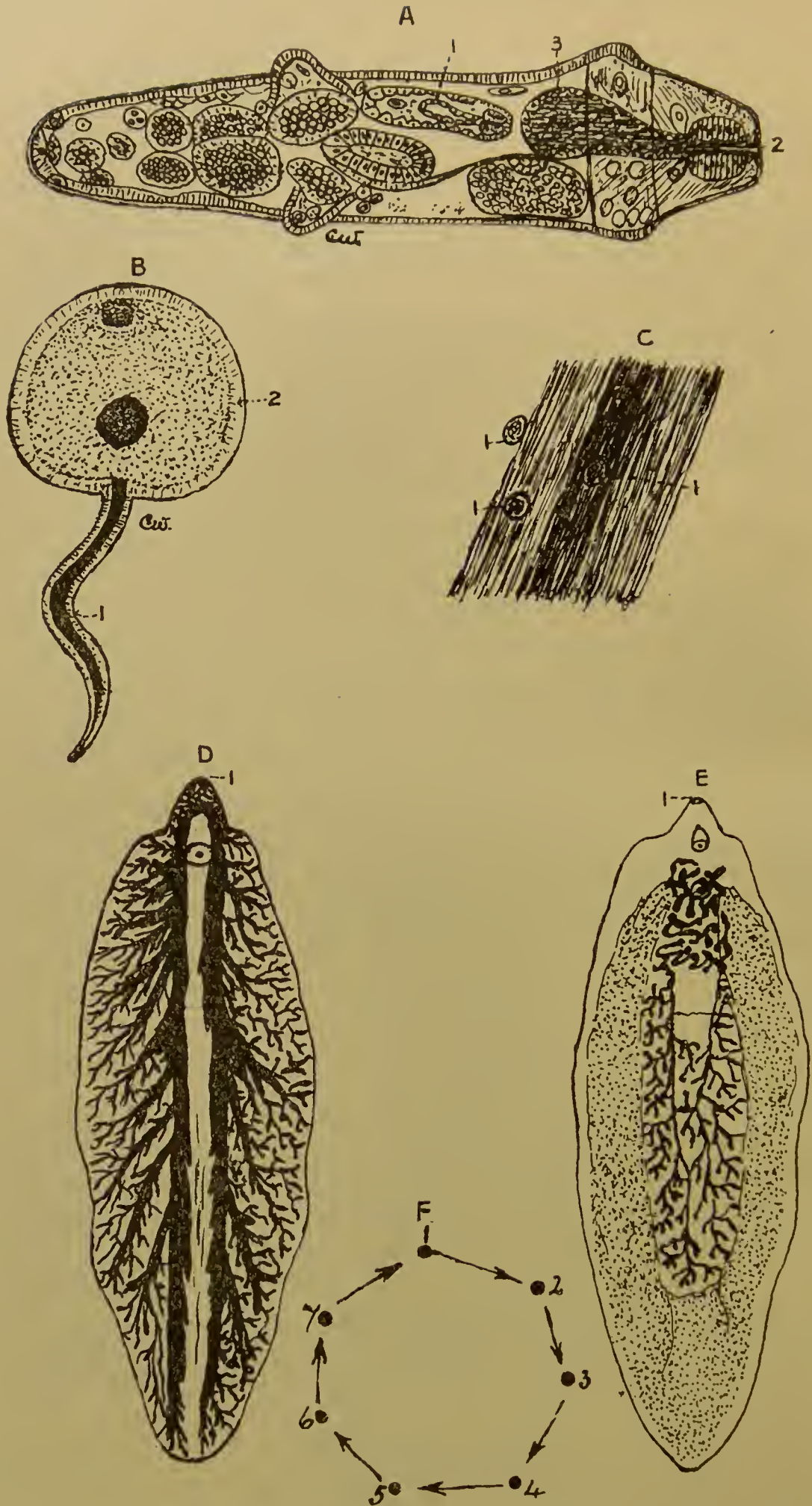
In the autumn, the snail, just before going into its winter quarters, *i.e.*, burying itself in the mud, may become infested with one or more embryos, and, for the want of heat, their further development is arrested until spring, when the rays of the sun bring the snail to the surface of the ground, and the various transformation stages of the embryo-fluke is carried on, provided heat and moisture are present; this, to my mind, is the greatest cause of the infection.

The eggs deposited by the mature flukes in the liver, and again deposited on the ground in the winter months, are in great danger of being destroyed by the want of heat to germinate the embryo, as well as by the absence of the snail, which is in its winter habitat. Sometimes, however, too many embryos enter one snail, this resulting in not only the death of the host, but in their own as well.

As may be inferred from the foregoing extract, the disease is not so rife in dry seasons, but is very common after wet summers.

Animals may be affected as early as midsummer, but August, September, and October are the principal months for contamination, and as it takes ten or twelve weeks after the entrance of the *pupæ* into the liver, before any bad effects are noticed, therefore December, January, and February are the chief months in which the flukes are seen fully matured.

The fluke has been proved, beyond all doubt, to be a fresh water creature, and, as mentioned previously, the disease is never met with



EXPLANATION OF PLATE XX.

- A. A fully-developed Redia, showing
 - 1. A young Redia.
 - 2. The Mouth.
 - 3. The Stomach.
- B. A Cercaria of Liver Fluke, showing
 - 1. The Tail, by which it swims.
 - 2. The Cyst or Envelope.
- C. A Portion of Stem of Grass, showing
 - 1. 1. 1, The Cysts fixed to the same, each Cyst containing the Pupa of the future Liver Fluke ready to be swallowed by sheep.
- D. A full-grown Fluke, showing the Digestive System, and
 - 1. The Mouth.
- E. An Adult Fluke, showing the Reproductive Organ as, branches, and
 - 1. The Mouth.
- F. Represents the Life History of the Liver Fluke.
 - 1. The Fertilized Egg.
 - 2. The Ciliated Embryo.
 - 3. The Sporocyst.
 - 4. The Redia.
 - 5. The Cercaria.
 - 6. The Encysted Cercaria (Pupa).
 - 7. The full-grown Fluke.

on salt marshes. Therefore, the land should be dressed in Autumn and Spring with salt. The former application to destroy the snails before they seek their winter shelter, and the latter to annihilate any who may have escaped the previous dressing, as they come to the surface of the ground; as already stated, $\frac{3}{4}$ per cent. of salt proves fatal. Salt should also be given in the animals' food. These precautions should be especially attended to after wet seasons.

Dysentery, or Bloody Flux, is a chronic inflammatory action of the lining membrane of the bowels—or ulceration, in some cases—with extensive diarrhœa, of a thin bubbly character, mixed with blood. It is generally caused by coarse food, from undrained and moorland pastures. At one time it was of very frequent occurrence, but of late years has not been nearly so common. Sometimes neglected diarrhœa may run into this complaint, and, at other times, it is a symptom of *Tuberculosis*. Small doses of linseed oil and chlorodyne should be given, and to these may be added from 20 to 30 drops of oil of cloves or creosote; good nutritious and easily digested food is highly necessary, such as milk and linseed jelly to drink two or three times a day.

Peritonitis consists of inflammation of the serous membrane, called the peritoneum, which lines the inside walls of the belly, and the outside of the bowels. Injuries—the results of foaling, calving, lambing, or castrating—are the principal causes, while, at times, it occurs without any appreciable cause whatever. The disease steals on so insidiously that the affected animal is generally at death's door before much notice is taken of it: this is especially noticeable in the horse. The cow may linger on for a few days, while the horse generally dies in a few hours after being noticed.

The animal, as it were, bleeds to death, the watery portions of the blood oozing through the walls of the blood-vessels into the abdominal cavity, which, on *post-mortem* examination, is found to contain a large quantity of straw-coloured fluid. When pain is present, hypodermic injections of morphia should be given, and cloths, wrung out of hot water, rolled round the body, covering these again with dry rugs.

Dropsy, or Ascites, may arise from *Peritonitis*—disease of the liver and blood-vessels; or from *Tubercle*. It is not of common occurrence. The chief symptoms seen are enlargement of the belly, with swelling of the limbs. Good nutritious food, with iron tonics and diuretics, should be resorted to; while, in some cases, it is necessary to “tap” the animal.

The Liver is a large, reddish-brown, glandular body, situated between the stomach and diaphragm, and held in its position by ligaments. It consists of three lobes in the horse, and four in the cow, and is covered by a coating of peritoneum, called “*Glisson’s Capsule*.”

The substance consists of small lobules, made up of cells, arranged like a cartwheel, between which the capillaries run. The cells take out from the blood certain materials for the formation of bile, while there are three sets of blood-vessels in connection with it:—

1st.—The *hepatic artery* supplies it with nutrient blood.

2nd.—The *hepatic vein* conveys venous blood back to the heart.

3rd.—The *portal vein*, or functional vessel, brings the blood, charged with absorbed material, from the stomach, spleen, pancreas, and mesentery. From this latter source the bile elements are extracted, and the bile manufactured by the liver cells is then conducted by the biliary tubes, which unite to form the hepatic duct, opening into the small intestines, close behind the stomach. All animals, with the exception of the horse and rat, have a bag for the purpose of collecting and storing this bile, called the *gall bladder*.

Bile is a *viscid*, greenish-yellow, and bitter fluid. It assists in digestion and absorption in the small intestines, increases the action of the bowels, and prevents putrefaction of the food in the intestines.

The liver is the largest organ of the body; but, while frequently the subject of a great amount of disease and disorder in human beings, is, happily, not nearly so subject to derangements in the domestic animals. Like all other parts of the body, it is liable to inflammation. The symptoms are not very well defined, and diagnosis

has to be arrived at by negative results. Such cases should always be entrusted to professional care.

Occasionally, on making *post-mortems*, enormously enlarged livers are found, both in horses and cattle, but the animals, when alive, gave no indications of such ailments being present. Sometimes, however, these enlarged, or *hypertrophied* livers are accompanied in horses by dropsical swelling of the legs, and shortness of breath; while in cattle, the brisket, under side of the neck, and lower jaw, become filled with a watery effusion. This latter symptom is also seen in traumatic heart diseases in cattle.

When cattle are heavily stall-fed with fancy foods, too highly seasoned with aromatic flavouring, and containing an excess of *amylaceous* matter, such as damaged rice, starch, sugar, &c., or where there is a preponderance of carbonaceous over nitrogenous principles—in other words, a badly-balanced food—their livers are apt to undergo *fatty degeneration*, or *fatty infiltration*. In the former, the structure of the glandular matter becomes changed into that of a fatty nature; while in the latter, fatty matters are deposited in the small inter-lobular spaces. These cases may be sub-acute or chronic. The animal refuses its food, drinks large quantities of water, and soon becomes greatly emaciated, but rarely hidebound (although the hair looks staring and on end), with a whitey-blue, exhaustive, stinking diarrhœa. Treatment is very unsatisfactory; a fatal termination usually supervening. Bromide of ammonia, with carbonate of soda, $\frac{1}{2}$ ounce each, night and morning, may be tried.

Jaundice, or Congestion, is the most frequent liver disturbance met with in horses and cattle. It generally occurs in hot, dry seasons; the animal becomes sluggish, languid, and lazy, drops the head, loses the appetite, but evinces no pain. The pulse is full, slow, and soft, eyelids and gums of a dirty yellow or orange colour; tongue furred; breath fœtid; bowels costive; fœces of a light slate colour; while, in some cases in the horse, the animal goes lame on one fore-leg—usually the off (right) one. Cattle are more subject to this complaint than horses, and in them the dirty yellow or orange

colour can be easily noticed in the corners of their eyes, on the udder, under the tail, and, indeed, on any white part of the skin, or any visible mucous membrane, particularly the vagina. The belly is flat ; the appetite bad ; and the animal rarely chews the cud.

A good dose of opening medicine should be given at first. Calomel, from 1 to 2 drachms, suspended in from $1\frac{1}{2}$ ounces to 2 ounces spirits of nitre, and a pint of linseed oil, may be given with advantage, either to horse or cow, followed up by alkaline and vegetable tonics.

The liver is also a frequent seat of tubercular deposits, abscesses, and tumours.

Gall Stones.—These are extremely rare, either in horses or cows. Some years ago I had, in conjunction with Mr. T. Briggs, (now at Darlington,) a case at Mr. G. T. Carr's, then at Silloth Farm, the subject being the hunting sire, "Best Returns." It commenced with all the indications of sub-acute inflammation of the bowels, with severe colicky pains. The acute symptoms were got over, and the case settled down into a chronic form, and for fully five or six weeks, the bowels were very irregular: sometimes slightly purged, and at others costive, with dry, hard, primrose-coloured pellets excreted. At length it was seized with all the symptoms of uræmic poisoning, head pendulous and oscillating; fore-feet stiffly pushed forward, and legs occasionally bended at the knees; hind legs placed wide apart; pulse very full, with slight colicky pains—if made to move, it tumbled against the side of the box, which had to be padded with sacks of straw. Bleeding had a wonderful effect, and was frequently resorted to; in fact, it was the only thing which gave any relief.

At last it was found dead in the box, and the *post-mortem* showed a *gall stone* of a beautiful chrome-yellow colour, about the size of a pullet's egg, situated in the hepatic duct, close to its opening into the intestines. It was made up of concentric layers of a very delicate nature, fleecing off on the slightest touch.

The liver also becomes *ruptured*. This may be occasioned by engorgement and congestion of the portal vein, but it is more often due to the effects of falling in jumping. As a rule, it proves fatal. In these cases, the mucous membranes become pale and blanched, with a running-down pulse; then muscular twitchings supervene, with icy-cold legs and body, followed by death.

I have never, as yet, met with any disease of the *pancreas*, either in post-mortems, or otherwise.

The Spleen, Milt, or Cat-Collop, is situated on the left side of the larger curvature of the stomach. It has a bluish-grey, mottled appearance (in the pig, slightly red), shaped like a sole, and is very soft and elastic. It is ductless, having no opening, except by means of the blood-vessels. Its proper functions are not exactly known, though several are ascribed to it. Still, it can be done without, as cases are on record where the spleen has been successfully removed from dog and man, without causing death, or, indeed, much inconvenience, when the diet was properly attended to. My opinion is, that it acts as a reservoir for the old, worn-out red corpuscles, which have done their duty in the blood. These, rushing to the spleen, during digestion, are carried by the splenic into the portal vein, thence to the liver, where they are disintegrated, and help to form bile. (*See Circulation.*) The spleen is supplied with blood by the splenic artery—a branch of the *cæliac axis*.

The **Cæliac Axis** is a large artery, arising from the posterior aorta, just after it passes through the diaphragm; it divides into three vessels:—1st. The *gastric artery*, supplying the stomach; 2nd. The *hepatic artery*, the liver; and 3rd. The *splenic artery*, the spleen, with nutrient blood.

Although the spleen can be done without, it is very dangerous when diseased. Sometimes, however, in the horse, it reaches an enormous size, without any appreciable symptoms during life.

Lymphadenoma.—This is a peculiar disease of the spleen in the horse—said by some to be of a tubercular character. The symptoms are very remarkable—the animal feeds well, but gradually

loses flesh, with a dingy, staring coat, and a staggering, swinging gait. The visible mucous membranes, such as eyelids, &c., are as pale as white paper; the pulse is soft, and rather frequent; the bowels, as a rule, are quite normal. The animal lingers on for some considerable time, having to be supported on slings to keep it on its feet. These cases are invariably fatal.

Splenic Apoplexy, or Anthrax is of much more frequent occurrence in cattle than in horses, and, although small microbes—bacilli—are found in the blood after death, I hold that it is a purely *dietetic* disease at the first, and can be produced by the various methods of preparing food. The process of fermenting hay-chop, if not properly and carefully carried out, is very productive of this disease. This process consists of saturating chopped hay well with cold water, and mixing with turnips, letting the mixture lie until fermented—that is, until the starchy contents have been converted into their sugary form. Should this, however, be carried too far, viz., through the sugary, to the acetous, stage (and this is easily induced by leaving some of the old chop and mixing it with the new), and the cattle be fed on this for any length of time—a fortnight, or even less—bad results will follow, more particularly if decorticated cotton cake, or treacle, have been added to the concoction. Over-macerated brewers' grains, if left exposed to the action of the atmosphere, will, in time, cause the complaint, if the utensils are not properly cleansed every time a fresh mixture is made. Mouldy food—particularly undecorticated cotton cake—and feeding on sour, undrained pasture land, are other frequent causes of so-called "Outbreaks."

I have never known anthrax to extend from one farm to another, nor, indeed, *directly* from one animal to another in the same byre. All the cases which have come under my notice have been distinctly traced to the food, on changing which, the disease invariably disappeared, and no more cases occurred. Should, however, the flesh or blood of an animal, dead of anthrax, be eaten by dogs, cats, poultry, &c., it rapidly proves fatal to them; while any man, having a wound on his hand, when making a post-mortem of an anthrax subject, is in

great danger of his life through inoculation. It is, therefore, a highly inoculative disease; hence, the carcase of an animal, the death of which is attributed to anthrax, should be buried or burned at once, without being opened. However, I do not believe that it is infectious or contagious in the slightest, even though it is classified under the Contagious Diseases Animals' Act.

Microscopists affirm that this disease is due to a *bacillus*—termed the *Bacillus Anthracis*—and yet these same experts say that this bacillus is not to be found in the blood until two or three hours before death. What, then, is the disease prior to the invasion of the body by these bacilli? I say that it is a want of sufficient alkalinity in the blood to keep up its plasticity, and preserve the balance between the solids and fluids of the body, and is due to giving food of a too acid or sour character. It is recorded that the bacilli require a quantity of oxygen for their formation and development, yet they are only generated an hour or so prior to death, and respiration by this time having become so hurried, and lungs congested, that it is impossible for the blood to get properly oxidised. How is this?

Again, these bacilli are said to form *spores*, but these cannot be done inside the body, so we are told. This spore formation requires a high temperature. Some say it may occur at any temperature between 64° to 113° (Fahr.), others aver that at from 108° to 109° no spores will be formed, and that bacilli brought forward at this temperature soon lose their power, and degenerate.

If, then, the bacilli are only formed in the blood, two or three hours before death, the spores cannot be present in the blood before death, nor, presumably, after, seeing that they require a free access of oxygen, and a temperature of, *at least*, 64°, (neither of which being likely, to say the least of it, in a dead body, which rapidly cools), and if, immediately the animal ceases to breathe, the bacilli fail to develop by fission as well, and, in the course of twenty-four to thirty hours, the putrefactive bacteria destroy all existing bacilli; and, lastly, with our low ground temperature—especially when sunlight weakens the power of reproduction—may I ask, how is this disease to spread?

I say again, primarily, the disease is purely dietetic in its nature, due to some peculiarity of the food, which may ultimately favour the development of the bacilli.

When an animal is attacked with Splenic Apoplexy, it, as a rule, proves fatal in a few hours. Should it be found to have died very suddenly, either in the field or byre, and to be very much swollen, with rectum turned out, and a bloody mucous discharge coming from nose, mouth, rectum, and vagina, it is recommended that it be carefully removed—tying cloths over its orifices—and buried without opening or skinning. It should be buried at least six feet deep, covering the carcase with quicklime, in which a quart of crude carbolic acid ought to be mixed. All parts with which the animal has come in actual contact should be washed with a 5 per cent. solution of carbolic acid, as this is said to kill all bacilli.

The treatment of splenic apoplexy is not very satisfactory—2 to 4 ounce doses of hyposulphite of soda, with aromatic stimulants, may be given every four or six hours. Regarding preventives, I have every confidence that if the lands are well dressed with salt, and the animals given a tablespoonful daily in the food, properly prepared, this disease will be entirely prevented.

Red Water will be dealt with under “Blood Diseases” (*see Circulation*), although I consider this another purely dietetic complaint.

Braxy.—In some seasons the disease is very rife amongst sheep, when first folded on turnips: the sudden change of food, and some peculiarity of the weather, having a powerful influence in producing it. When sheep are first put on roots, they should have a small quantity of hay, well watered with salt and water, or a little salt given daily with some crushed oats and bran. Were these measures resorted to, there would be little, if any, fear of braxy appearing.

Mesenteric Disease.—The mesentery, or net—particularly in well-bred cattle—is often the seat of abscesses, or tumours, of a *tubercular* nature—these go under the name of *Clyers*, *Piners*, &c. The skin has a dirty yellow, scruffy appearance, very tight on the body, hide-bound, and there is great emaciation and, as a rule, diarrhœa.

Little can be done in these cases, medicine having little or no effect. Sometimes, however, on the first appearance, small and repeated doses of sulphuric acid may be serviceable, with a wineglassful of cod-liver or linseed oil daily.

The most profitable plan is to make away with them. Milk from such animals should never be sold or used.

Calves.—As already named, the fourth stomach is the largest in the calf, on account of the young animal living principally on a milk diet. The first, second, and third compartments are not required to prepare the food until the animal begins to eat hay, or other rough material. The fourth stomach of the calf, called *Rennet*, (used in cheese-making), contains juices which coagulate the milk. This fact is of great importance in the feeding of calves, showing that they should be fed with small quantities, and frequently—for the first fortnight, at least. They ought not to be fed less than four or six times a day, although most farmers feed them only twice a day, giving large quantities at once. This practice is much to be condemned, for, as soon as the milk comes in contact with the walls of the stomach, it is coagulated, or curded, this being the first process of digestion. The weak digestion of the calf is quite unfitted for disposing of such a bulk at a time, and, perhaps, some of the old curd is still in its stomach when next fed. This sets up irritation and inflammation of that organ, which nature tries to relieve by means of diarrhoea, called

White Scour.—This complaint carries off large numbers of calves yearly, and when once it gets started, is bad to deal with, running through the young stock like an endemic, having all the characteristics of being infectious, while, no doubt, it is, in some cases, and due to the *lactus bacillus*. It should have careful attention on first noticing. The hulls, or boxes, should be at once thoroughly cleaned out, and the walls washed with lime and carbolic acid, sprinkling the same on the floor. This should be done once every week or ten days, until the progress of the complaint is arrested. Attention should be given to the food of the cows; if cotton cake, or highly nitrogenous foods are being used, they must be stopped

for a few weeks, and crushed oats, bran, and Indian meal, or pollards given. The nitrogenous matter in cotton cakes causes the milk to be of too stimulating a nature for a young calf's system to assimilate.

Treatment consists in giving good clean dry bedding; at the commencement, a small dose of castor oil—say 2 or 3 ounces, with a teaspoonful of laudanum, may be administered with good effect; following up with teaspoonful doses of bi-carbonate of soda, or a wineglassful of lime water in the milk each night. Two teaspoonfuls of Gregory's mixture are sometimes very serviceable. Prevention consists in feeding often, and in small quantities, for the first fortnight, giving twelve hours milk with the cream off, warmed up to 90°, in a water bath. Great attention should be giving to housing, good dry bedding being indispensable. If, however, mother and calf are allowed to run together in a box, for a week or so, it will save a lot of trouble from this, and, also, perhaps, other complaints, as, for example, milk fever, &c.

Hair Balls.—These are frequently formed in the stomach of a young calf. They may be caused by the animals licking one another, by which means a quantity of hair is drawn into the mouth by the tongue, whence it is passed on to the stomach, where it becomes matted and formed into balls.

Another cause is that of giving the calf unstrained milk, which is a great mistake. Milk given to calves should always be put through a strainer.

When these balls are present, they cause a good deal of derangement, with impaired appetite, and puffing up, or swelling, of the left side. Should this swelling occur several times daily, the best plan is to make the animal into veal as soon as possible. Occasionally, a calf may recover, in which case, the ball or balls are found in the paunch of the adult animal on slaughtering.

Navel-Il.—This is a common disease in calves up to a week or fortnight old. It is a septic inflammation of the navel-string, with suppuration. The animal appears dull and listless; lies stretched out

flat on its side, refuses its milk, and breathes fast and catchy, perhaps moaning. On examining the navel, it will be felt hard and swollen. It should be laid open with the knife, and dressed with carbolized oil; a flannel folded five or six ply thick, wrung out of hot water, then ought to be applied to the navel, keeping this in place with a bandage round the body. Small doses of Gregory's powder, or magnesia, may be given daily. Associated with this complaint, we have another disease, very formidable, both in foals, calves, and lambs, called

Joint Fellon.—A large number of young animals are yearly lost from this disease, which consists of a septic inflammation of the joints. The knee, hock, and stifle, are those most frequently attacked by its baneful action; it is usually noticed a few days after birth. The animal is very feverish, and unable to stand when put on its feet, and, on being made to move, lameness is noticed in one or more of its limbs. There is enlargement of the joints, accompanied by great pain on pressure being applied. As a rule the disease is fatal. On opening the diseased joints, they are found to contain a quantity of *sanious* brown stinking fluid, mixed in which are shreds of tissue.

For years, I have been under the impression that this disease is due to septic material being carried into the system through the navel opening, which, in most cases, is found to be open, with a slight discharge of thin watery fluid; consequently, as a preventive, I strongly recommend that at all times the navel string be tied with a piece of cord dipped in carbolized oil, or a waxed thread, as used by shoemakers; above all, the box in which the mare foaled, or the cow calved and cleansed, should be thoroughly washed out with water, containing carbolic acid. Clean dry bedding is an absolute necessity.

Treatment is extremely unsatisfactory; rubbing the affected joints with *essential oil of camphor*, and giving dessert-spoonful doses of liquid *sanitas* in milk or water, every six or eight hours, answers as well as anything I have tried.

SEVENTH LECTURE.

DENTITION IN HORSES AND CATTLE, AND DENTAL DISEASES.

THE teeth are the principal agents in mastication ; and, although composed of the hardest structures in the body, are, in the first instance, developed by a very interesting process, from one of the softest—the mucous, or lining membrane of the mouth.

For description, the tooth is divided into the crown, neck, and root, and is made up of three structures—*ivory*, or *dentine* ; *enamel* ; and *cementum*, or *crusta petrosa*.

The *dentine* is whitish-yellow, and forms the bulk of the tooth. It is found in the middle, in contact with the pulp, and consists of about 72 % earthy matter, and about 28 % animal matter.

The *enamel*—the hardest substance of the three—is of a pale bluish-white, and contains 95 % earthy, and 5 % animal matter. It acts as a protection, covering the external parts of the crown, and is interspaced in irregular curves between the *dentine* and *crusta petrosa*.

The *crusta petrosa* is yellowish-white and found on the outside, in connection with the root, or fang, and softer than either of the former : in fact, it is the true bone of the tooth, and is composed of 67 % earthy, and 33 % animal matter.

There are two sets of teeth, viz. : *Temporary*, or *Milk Teeth*, which are much *smaller* and *whiter* than the second set—the *Permanent*.

The marks on the crowns of the *lower incisors* are an indication of the horse's age up to eight years.

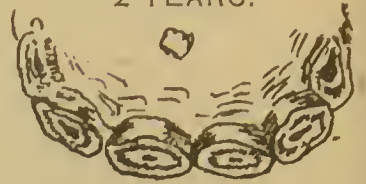
10 DAYS.



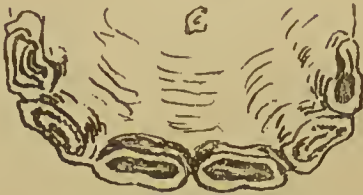
1 YEAR.



2 YEARS.



3 YEARS.



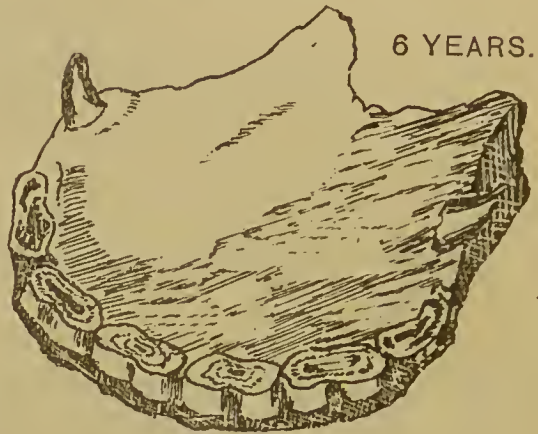
4 YEARS.



5 YEARS.



6 YEARS.



7 YEARS.



8 YEARS.



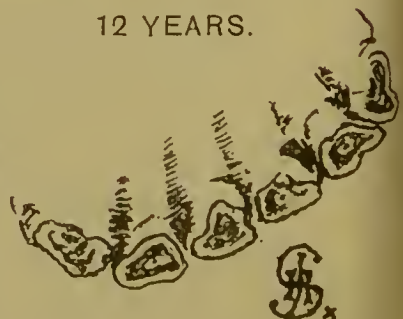
10 YEARS.



20 YEARS.



12 YEARS.



The indication marks in the lower jaw are nearly worn out in the central incisors at six years, in the lateral at seven years, and in the corner incisors at eight years old. In an old horse, with well-formed teeth, artificial marks are sometimes burned in, to give the animal the appearance of being young. This process is called *Bishoping*, so named from the man Bishop, who introduced it, but is readily detected, as the enamel round the depressions is destroyed in the operation.

At the age of from nine to ten years, the teeth change their shape, and begin to turn *triangular*, and long. At ten years, the upper corner incisor presents at the top, close to the gum, a *dark yellow groove*, which, as the horse grows older, extends down the middle of the tooth till, at the age of twenty-one years, it reaches the bottom. When this mark is present—which is not always so—it is a very good indication of the age; but see the diagrams, which are after “GALVAYNE.”

NUMBER OF TEETH.

Animal.	Incisors.	Canine.	Pre Molars.	Molars.	Total.
Horse	.. $\frac{6}{8}$	.. $\frac{2}{2}$	.. —	.. $\frac{12}{12}$	.. 40
Cow	.. $\frac{0}{8}$	.. $\frac{0}{0}$	.. —	.. $\frac{12}{12}$	.. 32
Sheep	.. $\frac{0}{8}$	.. $\frac{0}{0}$	.. —	.. $\frac{12}{12}$	.. 32
Dog	.. $\frac{6}{6}$	.. $\frac{2}{2}$	.. —	.. $\frac{12}{14}$	.. 42
Pig	.. $\frac{6}{6}$	.. $\frac{2}{2}$	.. $\frac{2}{2}$	.. $\frac{12}{12}$	.. 44
Man	.. $\frac{4}{4}$	.. $\frac{2}{2}$	.. $\frac{4}{4}$	.. $\frac{6}{6}$	.. 32

If there is one thing more than another that should command the attention of the country practitioner, it is dentition. The condition of the teeth, at times, creates various disorders, disease, and even death. By the casting or shedding of the crowns of the temporary, and their replacement by the permanent teeth, together with certain marks, the age, for a time, is indicated.

Looking at the diagrams, you will notice that at birth the foal generally has two central incisors, and three molars on each side, above and below (sixteen in all), all of which are temporary.

At six to eight weeks old, it gets two lateral temporary incisors, above and below; and from eight to ten months, the corner incisors. From twelve months to two years of age, small ponies are sometimes

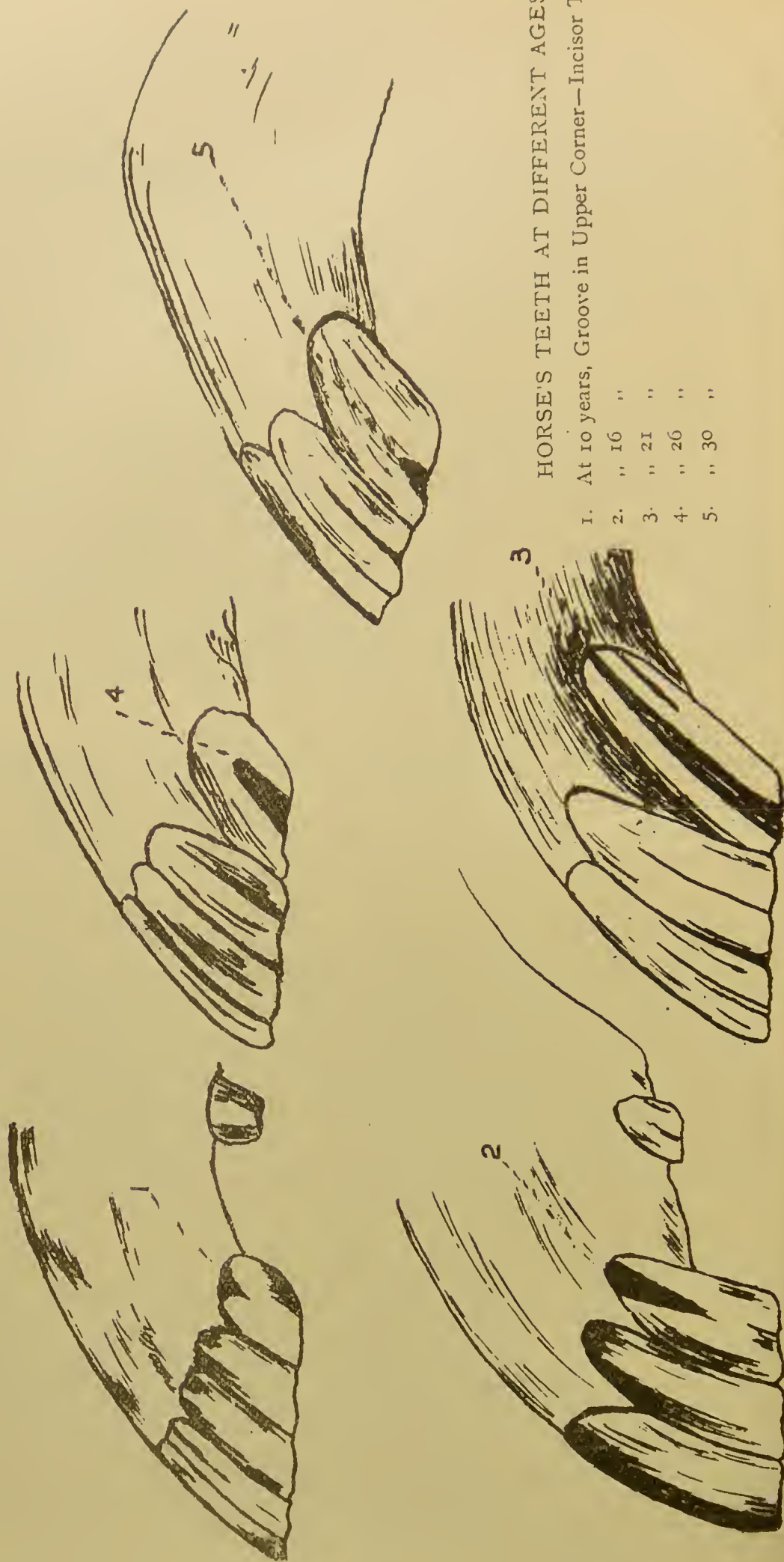
passed off as five years old, more particularly coal-pit ponies, the marks on the crowns being similar. This deception can be detected by looking at the front aspect of the teeth, when it will be seen that the temporary teeth are small, and white, with a plain, smooth surface, while the permanent are much larger and broader, and of a creamy tinge, with a well-defined deep dark groove down the front of each tooth.

At one year, the fourth molar (first permanent) appears, and from two to two-and-a-half years, the fifth molar should be into wear; and it is to this period of the animal's life I shall give most attention. In many cases, in cross-bred cart-horses, the fifth molar is not visible until the animal is from two-and-a-half to three years old. From two years and nine months till three years old, the horse commences to cast the two central incisors, also the first and second molars, above and below, which are replaced by permanent teeth.

By this we see, in some cases, which are of the greatest importance to us, that the horse, rising three years old, not only casts twelve temporary, but gets sixteen permanent teeth, viz., four central incisors, two above and two below; first and second molars on each side, above and below (eight); also the fifth molar (four).

About this time the animal is brought in from grass, and put to work. What with the dental irritation going on, and the new mode of living, is there any wonder that certain horses of peculiar nervous temperament suffer, and occasionally to a great extent? If we take into consideration the disorder and fever set up in some children during teething, and the nervous exhaustion and complaints arising therefrom, need we be at all surprised to notice, at this period, the commencement of several nervous derangements in horses?

Having had ample opportunities of inspecting animals, from foals upwards, I find it very rare to notice any sign or symptom of *chorea*, *shivering*, *string-halt*, or *clicking*, until the animal is three years old. From long observation, I am inclined to think that in the irritation



HORSE'S TEETH AT DIFFERENT AGES.

1.	At 10 years,	Groove in Upper Corner—Incisor Tooth.
2.	" 16 "	
3.	" 21 "	
4.	" 26 "	
5.	" 30 "	

set up during the extensive dental process I have just referred to, we have the commencement of these nervous maladies, through reflex nervous action, more particularly so, when there is a hereditary tendency thereto.

Therefore, the most critical period in the life of a horse is when it is rising three years old; for not only have we associated with it the already-named complaints, but we have, also, *strangles*; though, whether this is partially due to extensive dentition, or to the change from out-door to in-door life, I am scarcely able to say; yet, I am inclined to think that teething, in certain instances, has something to do with the cause.

Again, at this period, if the true process is not going on, we may have abscesses, forming at the root of the tooth, or in the sinuses, with disease of the *alveolar processes*, more particularly in the upper jaw, ending in softening and degeneration of the bone; or bony tumours may form on the tooth. (See diagram which represents a tumour on the crown of the fourth upper permanent molar tooth, due to extensive inflammation and degeneration of the bones of the face of a three-year-old filly.)

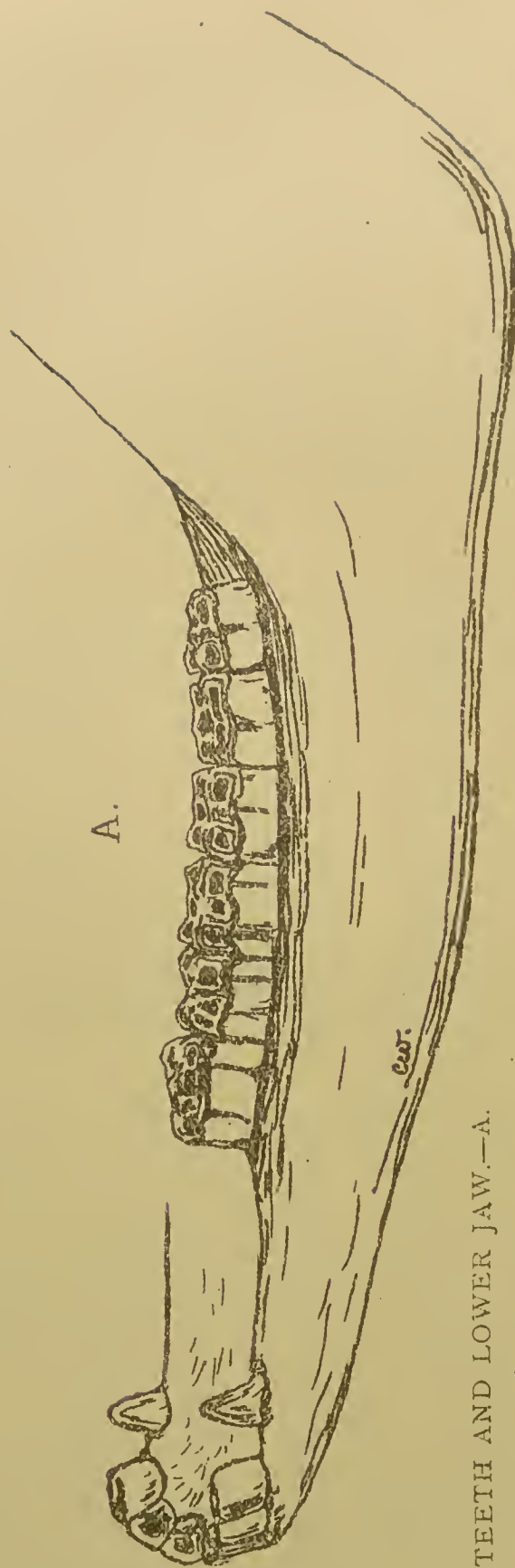
Shortly after I commenced practice, a three-year-old cart-colt was brought to me in a very emaciated condition, for the purpose of having its *lampers* burnt or cut. On looking into the mouth, I saw the crowns of the first and second temporary molars sticking on the top of the permanent teeth which were well up above the gums. Here, then, was the cause of the poor condition of the animal. I could not remove these shells with my fingers, and, having no instrument, I went to a blacksmith's shop, and had clips made on the sides of an old pair of tongs. With these I removed the eight shells, or crowns, and then prescribed tonic medicine. Up to this, I knew little about dental trouble, it being my first lesson. Since then I have devoted a good deal of time to it, and have had made, to my order, various instruments. (See diagrams.) I have frequently seen the crown of the second molar come off before that of the first. I have also, in one operation, removed the crowns of the first and second molars, joined together, of which I have several specimens. (See diagrams.)

When a young animal is suffering from retarded dentition, it loses flesh, and the belly becomes tucked up ; there is a long, shaggy coat, tight skin, ewe-neck, thin thighs, and flat ribs ; it drags its legs, and walks with a listless gait, feeds badly, and eats little or no hay. There is also occasional and exhaustive diarrhœa. Examine the mouth, and if the crowns of the temporary teeth are the cause, remove them. Prevention is said to be better than cure, and, people acting on this maxim, now have young horses brought to my place, from December to June, to have their mouths examined, when, if necessary, I remove the crowns. This long and varying period is due to the time when the animals are born.

When from three-and-a-half to four years old, the horse casts its lateral incisors and the third temporary molar, which are replaced by permanent ones, one each side, above and below. The sixth molar now comes into view ; thus, at four years old, it casts eight temporary, and gets twelve permanent teeth, but seldom seems to suffer so much as at three years old, although there is an old saying, that a four-year-old horse cannot stand work so well as a three-year-old. This, in my opinion, is due to the punishment it has gone through as a three-year-old, and which it has not thrown off. If you find an animal not doing well at this period, examine the mouth, and, if necessary, remove the shells.

As a rule, the lower come off sooner than the upper. In many cases, under the crowns, or between them and the top of the permanent teeth, we have a fœtid smell, as of diseased bone. (Was this the case with "Orme."?) I cannot recall an instance where I could attribute a cough to dentition, although it is very possible ; in fact, why should it not be so ?

At five years old, the corner milk incisors are replaced by permanent teeth, and the canines, or tusks, appear in the horse, but are absent in the mare ; occasionally, however, we find small rudimentary tusks in the latter. The horse is now full-mouthed.



HORSE'S TEETH AND LOWER JAW.—A.

B.



THREE UPPER SHELLS.—B.

C.



THREE UNDER SHELLS—(NOS 1. AND 2 JOINED TOGETHER).—C.

For further information on the subject, the reader is referred to Professor Brown's pamphlet on Dentition, published by Murray, Albemarle Street, London. I may add that I have found the Professor's little work very accurate.

With the exception of a young horse casting its teeth, and an old one with unevenly worn surfaces, I would not, on any account, give crushed or bruised oats, as the crowns of the horse's molar teeth resemble the surface of the old-fashioned millstone, being properly adapted for grinding the grain. I therefore recommend the oats to be given whole, so that the animal can have pleasure in grinding them, thereby getting the full benefit of the salivary juices, and their action on the starchy matters. Crushed oats are more liable to be bolted, and cause derangement.

The upper molar teeth in horses and cattle are much larger and broader than the lower ones; the upper jaw being a fixture, as it were, gives a broader and firmer surface for the rotatory movement of the lower jaw to act upon, thereby, in some instances, in aged horses, the uneven wear leaves sharp ridges on the outer edge of the upper molars and inner edge of the lower; these have to be dressed down with the tooth rasp, to prevent laceration of the tongue and inside of the cheeks. Occasionally the teeth become elongated, and very uneven (particularly the last tooth on the lower jaw), and have to be cut by special shears. For the latter, nothing beats Thompson's instruments. Remember, I am not the Thompson who claims the credit for this useful article. I always operate with the animal standing, except when I have a rough customer to deal with. Molars are sometimes split, through getting some hard substance amongst the food. For this there is nothing worse than foreign grain. A bit of stone, a piece of iron, or a nail may have got into the corn, and caused injury. By removing the loose portion of the tooth, the animal generally does well, but, in time, the tooth opposite becomes elongated, owing to its not meeting sufficient wearing surface, and has to be cut off, or rasped.

It is said by some writers that teeth grow; to a certain extent this is true, but at six years old all the teeth are fully developed, after which period they gradually wear away. This is well exemplified by the incisors, or nippers, becoming triangular as they wear down, when their crowns take the shape of the fang, or root.

Teeth, however, become elongated when they are not made use of, owing to the tooth opposite being decayed, or removed. As a proof that they wear, and don't grow, see diagram of the upper molar of a six-year-old horse, and one of a horse twenty-six years of age.

These damaged teeth are, however, most likely to become *carious*. I have come across a few of this nature, but, in young animals, as already said, I think the disease more frequently commences in the *alveolar processes* (bone plates), and sinuses; finally implicating the teeth themselves.

With the forceps (*see diagram*) I have had made, which are an improvement upon Professor Pritchard's, by the addition of the screw, and longer leverage, I can, in a few minutes, remove any molar, either from the upper or the lower jaw. In extracting a tooth, I always cast the animal, but have a great objection to casting aged horses with "hobbles." I prefer side lines in the latter cases. I do not use chloroform, unless specially requested, as I think it is not necessary. After removing the tooth, I always dress the hole every third day, by plugging with tow, saturated with three parts water and one part tincture of iron, which answers splendidly, finally filling it with gutta-percha. In one case, the diseased bone was so great, extending through into the nostril, that it took four ounces to fill the cavity. The horse has done well for years, and still wears the gutta-percha tooth. The tooth opposite, in the lower jaw, is kept down by rasping, every three or four months.

Wolf Teeth are found in the upper jaw, immediately in front of the first molars, and are generally thrown off when the horse casts the crowns of the two first molars, when rising three years old, but I have seen them in aged animals. I consider them rudimentary, and, in my opinion, they do no harm.



1. Upper Molar from 6 years' old Horse.
2. Upper Molar from 26 years' old Horse.
3. Tumour on Crown of 4th Upper Molar (*See Page 113*).
4. Malformed 4th Upper Molar.

Parrot-mouthed animals are known by the upper jaw being much longer in front, overlapping the lower, when the teeth in the latter become elongated from not meeting the wear of the upper teeth, and, in time, injure the bars or gums of the upper jaw. These cases have to be closely watched, and the teeth dressed when necessary. Sheep seem to be most subject to this peculiar formation.

The Cow has eight incisors, shovel-shaped, with well-defined necks; but they are found in the lower jaw only, *and are always loose in their sockets*, the upper jaw being provided with a cartilaginous pad.

The shedding of teeth in cattle is very irregular, varying fully six months in their development, according to the breed, and mode of feeding, but the following may be taken as a fair average:—

At birth, a calf may have from two to eight incisors in the lower jaw, and twelve molars (three on each side, above and below), all of which are temporary or milk teeth.

About six months after birth, the fourth molar, or first permanent makes its appearance; at from fifteen to sixteen months, the fifth molar is seen; at two years, the sixth molar is through.

About this period, the temporary, first and second inferior and first superior molars are thrown off, and six permanent teeth take their place.

The first inferior molar is very like a *wolf tooth* in a horse.

The second under molar is much larger, and frequently cast before the first, but, as a rule, they are generally shed together at the age varying from one year and nine months to two years and three months.

The second upper temporary molar is usually replaced by a permanent between two years and three months, and two years and nine months.

The third inferior temporary molar is remarkable in having three distinct sections, or columns, and resembles the sixth permanent; it is very much larger and longer than the second, and is cast between

two years and six months and three years old. Shortly after this, the third superior molar is shed. I have seen the third superior molar come off before the second, and have removed them both together. (*See diagram.*)

Incisors.—Between one year and nine months, and two years and three months, the two central incisors are replaced by permanents; at two years and six months, the two middle lateral incisors are cast, and the animal has four broad teeth; at three years old, six permanents are seen; and at about three years and three months, the corner milk teeth are shed, and eight broad teeth are in view. The permanent teeth are very much larger, and darker than the milk teeth, which are very white, and are readily distinguished.

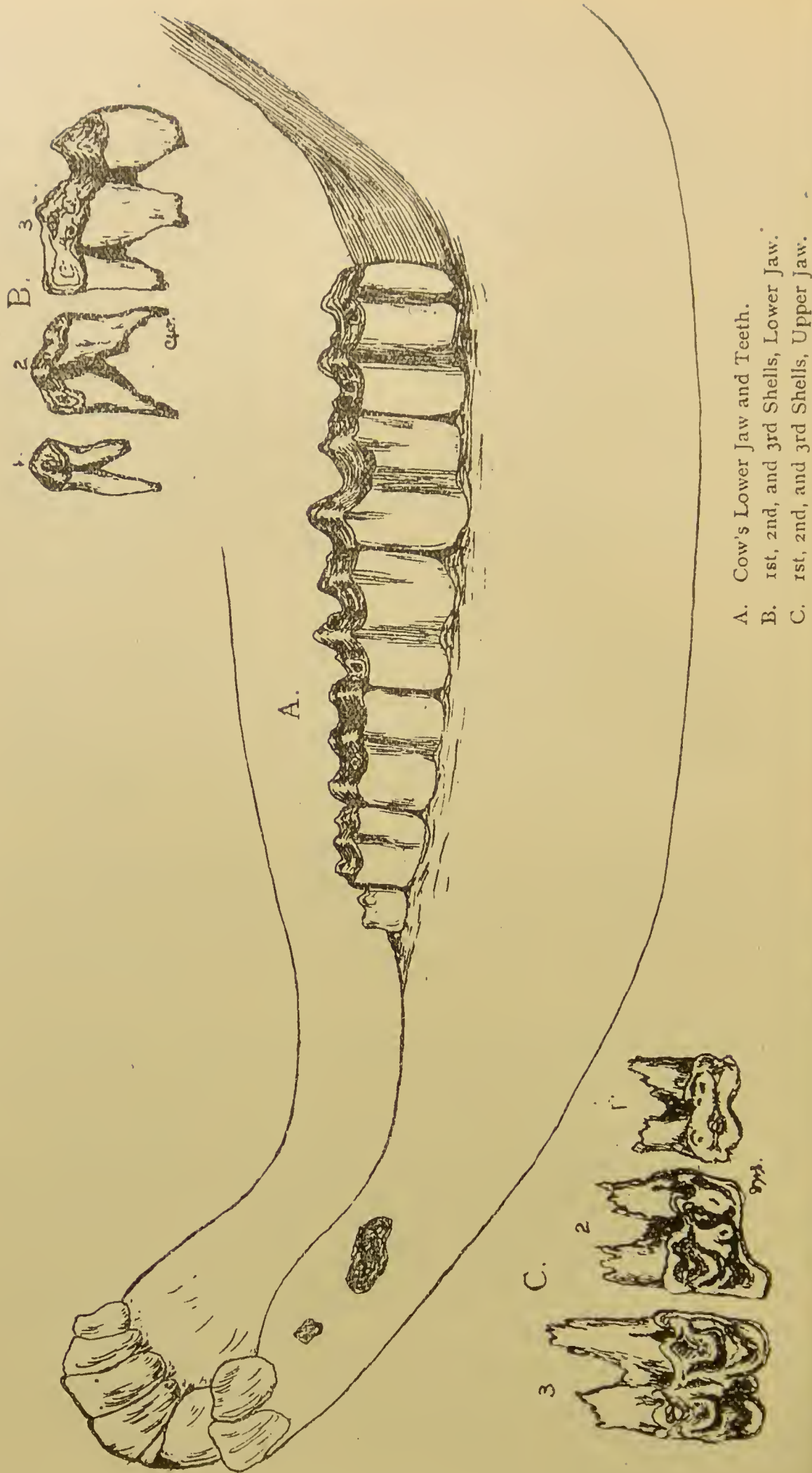
The crowns, or wearing surfaces of the molar teeth of cattle, are very unlike those of the horse, having sharp elevations and depressions, resembling the teeth of flesh-eating animals, and are well suited for tearing down rough fibrous grass, but are not adapted for grinding oats or other grain; the cow being a true herbivorous animal.

Teething in cattle, on many occasions, causes a great deal of constitutional disturbance, more particularly at from one year and nine months to two years and six months, by the temporary molars not being cast off, when teething fever, and, in many cases, fatal diarrhœa are set up.

As a rule, I examine the teeth of a large number of stirks in spring, and in autumn, and, where necessary, I remove the crowns.

Young animals, when suffering from the retention of the crowns or shells, have tucked-up bellies, flat ribs, tight hides, dirty skins, eyes gummy and congested, with mucous discharge, having all the appearance of piners. They feed very badly, and chew their cud in a very lazy and listless fashion, have extensive diarrhœa, and drink large quantities of water.





A. Cow's Lower Jaw and Teeth.
 B. 1st, 2nd, and 3rd Shells, Lower Jaw.
 C. 1st, 2nd, and 3rd Shells, Upper Jaw.

PLATE XXVI.

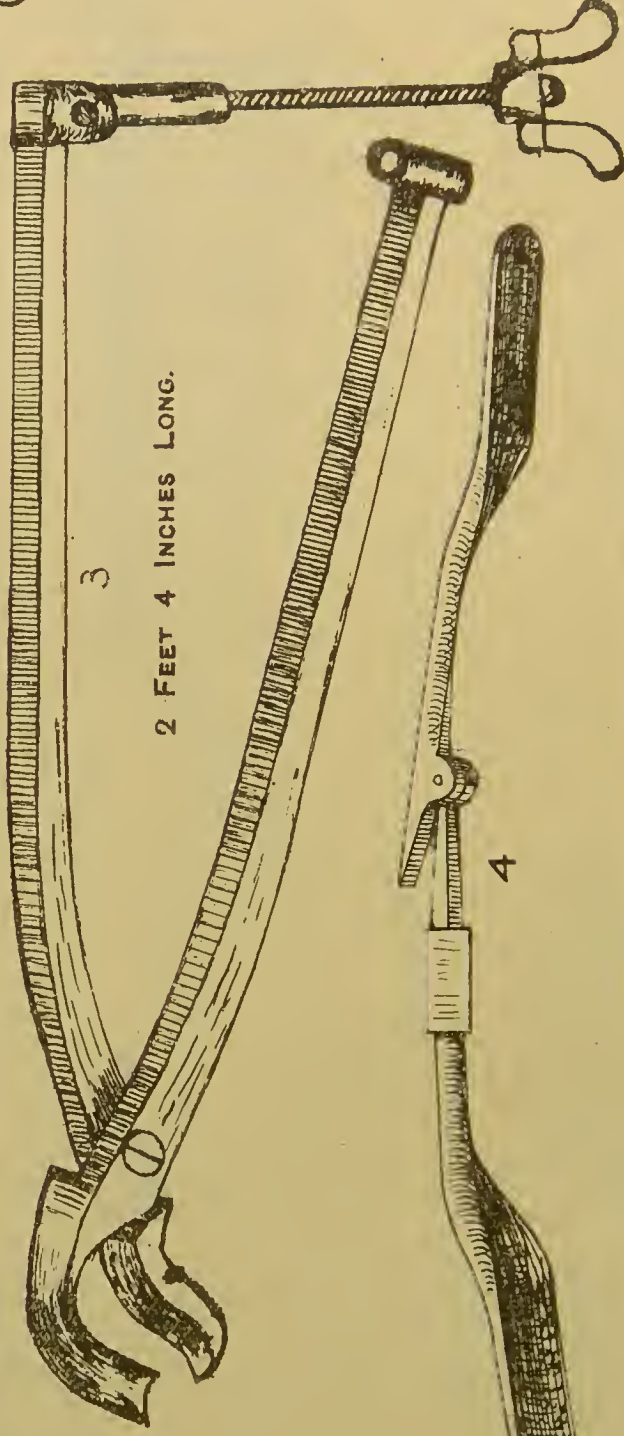
(Original—WARD.)



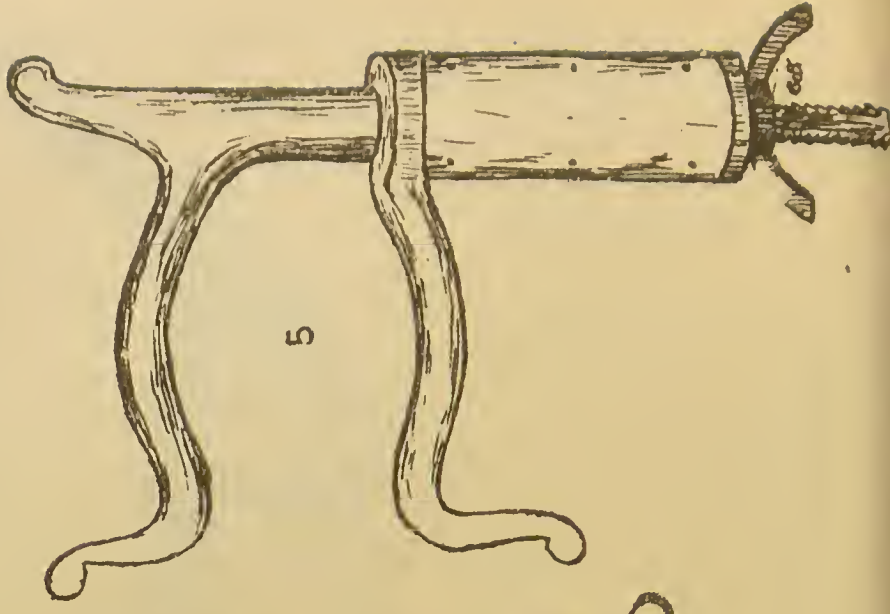
12 INCHES LONG.



15 INCHES LONG.



2 FEET 4 INCHES LONG.



1. Tooth Forceps for removing Crowns (Shells)—Cattle.
2. Do. do. do. (do.)—Horse.
3. Large Forceps with Screw for extracting Molars—Horse.
4. Portable Tooth Rasp.
5. Balling Iron.

I have frequently found the shells sticking fast between the cheek and the gums, in both upper and under jaws. Of course, any foreign substance, or anything wrong, in the mouth, generally causes a large flow of saliva. In such cases, the mouth should be examined, and the offending object removed, if possible.

I have come across split molar teeth, with the fractured piece sticking in the tongue. In all cases where the emaciation is great, I order good food, milk, linseed jelly, crushed oats, linseed cake, and bran, with a little salt, and give alkaline vegetable tonics, followed up with preparations of iron.



FEEDING STUFFS.

(IN CONNECTION WITH DENTITION.)

A few brief remarks anent some of the various kinds of feeding stuffs, may not be out of place.

Wheat.—This cereal, although a ready feeder, contains too much starchy matter to make it a safe article either for the horse or the cow when given alone, or in any appreciable quantity.

For a Horse, it should never be given raw, as it has a tendency to produce flatulent colic, congestive fever, weed, swelled legs, laminitis, and diarrhœa. It also throws the animal out of condition, causing it to puff, blow, and sweat on the least exertion. When given at all, it must be well boiled, used very sparingly, and mixed with other foods.

For a Cow, it should not be boiled, but given in a rough-ground or crushed state, and when used judiciously in combination with decorticated cotton cake, it is a splendid feeding substance.

Barley.—If there is one thing more than another which I have a great fancy for, it is well-boiled, sound, sweet barley, for either horse or cow, when recovering from any illness. If the animal can be induced to take it, there is nothing better, when mixed with a little bran. The boiling of barley seems to change its properties, converting the starchy matter as it were into *Dextrine*, thus aiding the first point in the process of digestion. For a very useful and agreeable change in feeding, there is nothing to equal a mash of fresh well-boiled barley, given twice a week, with a little bran and salt, being readily digested, and very refreshing to a tired horse after heavy work on a stormy day. Barley should never be given raw to a horse, as it produces intestinal disorders of various kinds.

For a Cow, it is best boiled, but may be given raw when crushed and mixed with other foods.

For a Calf, where milk is scarce, barley flour (meal) combined with the same quantity of good oat meal, well boiled, and mixed with skim milk, makes the best food, and will be found far superior to any of the fancy patent calf-meals. It keeps the stomach and bowels in proper order, and the young animal thrives and does well on the mixture.

Oats may be looked upon as the staple food for both the horse and the cow, *but upon no consideration should they be boiled for either*. It is a waste of time, money, and fuel to boil oats, as it makes no change in them; the horse is inclined to bolt them without chewing, and they pass through a cow unchanged.

For a Horse, as already named under teeth (page 115), oats should be given whole in the berry, except in the case of a young animal which is teething, or an old one with uneven teeth, when they may be bruised.

For a Cow, they should always be mashed or crushed, and mixed with other foods. Farmers, as a rule, have a very great fault in giving too much oats to cattle. The cereal being the produce of our own land, is apt to be used too freely, some giving as far as 8 lb. to 10 lb. per day, when only about half this quantity will be assimilated or taken into the system, the other half passing through the bowels as waste material. Better results may be obtained by selling half the oat-crop, and, with the money, purchasing linseed and cotton cakes. Mixing these with the remaining oats (crushed), gives a quicker return and richer manure heap.

Maize (Indian Corn).—This is a good all-round article, and will give off better results for one shilling than any other known feeder.

For a Horse, doing quick work, it is of no use, either boiled or raw, nor should it be given to a horse which has a tendency to lay on fat, or to one having little work to do, as it throws the animal out of condition, conduces to swelled legs, grease, and cracked heels, making the animal lazy and sluggish; but for a cart-horse, or waggon-horse, having regular working-days, it answers fairly well, when broken and mixed with oats, beans, pease, and bran.

For a Cow, or a Sheep, it answers splendidly, when made into meal, or broken and mixed with cotton and linseed cakes.

For a Pig.—It should not be given to a very young animal, as it is apt to produce irritation of the stomach, accompanied with fits. Pollards is much better, or barley and oatmeal mixed, and well boiled. For a half-grown, or full-grown, pig, Indian meal should be well boiled—scalding, as many do, is not sufficient.

Beans.—These are much favoured by many feeders, for both a horse and a cow, being given boiled, whole, or broken, and in meal.

For a Horse I have no fancy for them, owing to the tough, indigestible skin, and, from long observation, I find that, in many cases, they produce intestinal disturbance, with diarrhœa. Before using, they should be well washed, particularly foreign ones, as they are usually very much mixed and covered with dirt. Beans generally enter into the composition of the mixed horse-foods prepared by corn merchants.

For a Cow, bean-meal has many admirers, as a butter and cheese producer, and also for fattening purposes; but, as already stated, I do not fancy it, as I think better results can be obtained from other foods of a more digestible nature.

Pease.—Sound Canadian pease are more to my liking. They are not so indigestible, and a good handful given whole amongst the corn and bran, three times a day, will be found to have a grand effect on hunters, hacks, carriage and cart-horses. When my horses are in full work, I can get more staying-power from this feed than from any other.

Care must, however, be taken in purchasing pease, as of late years it has been noticed that many samples have been mixed with the Indian pea (*Lathyrus Sativus*), commonly known as the Dog-Tooth PEA, of which there are various kinds. This latter pea, when given for any length of time, may occasion paralysis, roaring, difficulty in breathing, and sudden death. A large number of horses, in various towns in England and Scotland, have died from the effects of these Indian pease.

Linseed is now grown in nearly all parts of the globe, and heavy consignments are yearly brought to this country from India, Russia, America, and other distant parts. The seed thus imported generally contains a large amount of foreign substances, such as weedy seeds, dirt, &c.—these, in some instances, to a very considerable extent, as is shown by the following analysis of a sample of dirty unscreened linseed :—

CHEMICAL ANALYSIS.

Sent by Mr. Henry Thompson.

23 ST. MARY'S AXE, LONDON, E.C., *January 16th, 1895.*

Moisture.....	7'14
Oil	32'18
*Albuminous Compounds.....	23'13
Mucilage and other Carbonaceous Principles	25'02
Phosphates	3'25
Fibre	6'83
Insoluble Matters.....	2'45
	<hr/>
	100'00
*Containing Nitrogen	3'70

PHYSICAL ANALYSIS.

Linseed	74'15
Foreign Seeds	23'40
Sandy Matter	2'45
	<hr/>
	100'00

Excluding foreign seeds, of doubtful value as food,
there would be :—

Oil	27'39
Albuminous Compounds	18'76

(Signed) A. Sibson, F.C.S.

REPORT.

23 ST. MARY'S AXE, LONDON, *January 16th, 1895.*

Mr. Hy. Thompson.

DEAR SIR,

I now send you my result of the Linseed sample last received. It shows to better advantage in the Chemical Analysis than it merits, by reason of the foreign seeds affording some oil and nitrogen. I have therefore given you the properties of foreign seeds, and also calculated the oil and albuminoids from the rare sample I did for you before. I append a list of the foreign seeds, &c., but do not profess to give the botanical names.

Yours truly,

ALF. SIBSON.

*Seeds, &c., in sample :—*Stems and Husks, Sandy Matter, Wheat, Oats, Barley, Cotton Seed, Hemp and Millet, Camelina, Rape, Mustard, Cockle, Polygonum.

Therefore, in using linseed in any form, these obnoxious bodies should be screened out. Linseed may be used after having been boiled, or steeped in hot water, or crushed into meal. A horse recovering from chest or bowel complaints is very much benefited by a little being added to boiled barley and bran.

For a Cow it may be given boiled, or crushed and mixed with the other food.

For a Calf it is generally boiled, or steeped, and mixed with milk.

ANALYSIS OF SCREENED BALTIC LINSEED.

Sent by Mr. Henry Thompson.

23 ST. MARY'S AXE, LONDON, E.C., *January 7th, 1895.*

Moisture.....	7.80
Oil	36.94
*Albuminous Compounds.....	25.31
Mucilage and other Carbonaceous Principles.....	20.27
Phosphates.....	3.63
Fibre	6.05
Insoluble Matters.....	traces
	<hr/>
	100.00
*Containing Nitrogen	4.05

(Signed) A. Sibson, F.C.S.

The above analysis is the one referred to by Professor Sibson as the "*rare sample*" in his foregoing Report. Note the amounts of oil, albuminous and carbonaceous matters, and compare with the analyses of the linseed cakes.

Linseed Cake.—This cake is made from a variety of seeds grown in different countries. Russian seed makes the best cake, and Bombay the next—that is, if regard is had to the amount of oil they contain respectively. There are a good many inferior makes of these, as of other cakes, as can be gathered from the physical appearances of the various brands on the market. There is a great difference of quality in what is called *pure* linseed cakes. Undoubtedly, the best, and those most entitled to be classed as *pure*, are those manufactured from seed that, previous to crushing, has been passed through a closely-meshed screen, which takes out all the impurities, such as small weedy seeds, dirt, &c., called screenings. Some manu-

facturers do not put themselves to the trouble of taking these out, but simply crush up the seed as they receive it. It sometimes happens that a cake-maker comes across a fairly clean parcel of seed, and gets a name for making a good cake, in case this lot was tested, when the next lot may be faulty; and yet this cake is called *genuine* linseed cake, being made from seed as imported, and without any admixture. But it must be understood that there is a considerable difference in the relative merits and value between the cakes made from screened and unscreened seeds. A good screened cake should show an analysis something like the following:—

	A.	B.	C.	D.	E.
Moisture	11.46	13.33	9.80	11.04	14.68
Oil	12.63	10.96	14.34	11.63	10.96
*Albuminous Compounds	30.00	31.87	29.50	30.12	30.13
Mucilage and other Carbonaceous Principles	32.29	30.85	30.58	32.82	30.75
Phosphate of Lime.....	4.90	4.66	4.90	4.89	4.26
Fibre	8.12	7.13	8.02	7.74	7.72
Insoluble Matter .....	.60	1.20	2.86	1.76	1.50
	100.00	100.00	100.00	100.00	100.00
*Containing Nitrogen	4.80	5.10	4.72	4.82	4.76

A. & B. — Analyses of Cakes guaranteed 95 per cent. of purity.

C.—Analysis of **Bombay** Linseed Cake. Shows a high percentage of oil, but a little too much Insoluble Matter; the seed cannot have been well screened.

D.—A sample of **Hamburg** Linseed Cake.

E.—A new-made **English** Cake, guaranteed, which shows too much moisture.

Cake showing an analysis of from 8 to 10 per cent. of oil is more frequently met with, and is by no means bad, but I should advise never to go below this figure, if a cake is wanted that will give satisfaction. It must be borne in mind that seed is crushed and pressed more for the oil it will produce, than for the cake alone:

linseed oil is worth about £25 per ton, while the cake is valued at from £6 to £7 per ton. It is, therefore, to the interest of the manufacturer to get the best and most improved machinery that will extract the greatest percentage of oil, and when this is done the cakes are generally hard and of a light colour. The broad, thin, flat cakes are of this class, and are largely manufactured in America, as well as in England. These often show from 6 to 7 per cent. of oil, and are useful for feeding growing cattle, and, at times, profitable enough to buy; but for quick feeding of stock, the old-fashioned oblong shapes, which are made from screened seeds, are the best, being guaranteed 95 per cent. of purity. They are much thicker, and richer in oil, — oil is looked upon as ready-made fat, — darker in colour, and of a softer texture. Good linseed cake is one of the best balanced foods we have, and is of great value for winter consumption, for feeding cattle and young stock. It is also useful amongst milch cows, though it is more a fat-producing than a milk-producing food. Another recommendation in favour of linseed cake is, that cattle fed upon it invariably enjoy good health, and are not liable to contract skin or other diseases.

For a horse thriving badly, with an unhealthy, ragged, dingy-looking coat, a handful of crushed, pure linseed cake, night and morning, mixed with corn and bran, has a splendid effect.

For a Cow.—Linseed cake may be given at the rate of from three to nine pounds per day, with the best possible results; whilst a young calf, six to eight weeks old, may receive it in quantities of from three to four ounces, with a little crushed oats and bran daily, gradually increasing the quantity.

Decorticated Cotton Cake.—This is chiefly made in America, as the husk of the cotton seed can best be removed when the seed is green. The cake is then manufactured from the seed or kernel. Good decorticated cotton cake should show analyses as follows;—

	F.	G.	H.
Moisture	7.10	8.10	8.20
Oil	14.08	13.50	19.04
*Albuminous Compounds.....	44.37	41.26	36.87
Carbonaceous Principles.....	20.43	23.00	25.57
Phosphates, &c.....	6.64	6.34	5.10
Fibre	7.38	7.80	5.22
Insoluble Matter	traces	traces	traces
	100.00	100.00	100.00
*Containing Nitrogen	7.10	6.64	5.90

F.—Standard Brand; a very good cake, rich in oil and flesh-formers.

G.—Union Brand; a very good average cake.

H.—La Grange Brand; showing an excess of oil and carbonaceous matters; the albuminous compounds are not so high as average cakes.

Like linseed, cotton seeds are crushed for the oil they contain, and of late, greatly improved machinery for this purpose has therefore been devised. Decorticated cakes are generally very hard, so much so, that farmers are almost afraid to use them. This causes some dealers to have their decorticated cake made into meal, an expedient which increases the risks to feeders, for the meal, when kept too long in closely-packed bags, becomes heated and perhaps mouldy, when it is dangerous to stock, for the small mould *fungi* are apt to produce blood disease, such as anthrax or splenic apoplexy. Great care is, therefore, necessary for the buyer not to purchase too much of the ground article at once. Decorticated cotton cake is also very dangerous when damaged at sea, for the same reasons as those urged against the mouldy meal. Numerous cases are on record, where numbers of cattle have died from the effects of eating moulded decorticated cotton cake. This cake should always be used in combination with some farinaceous matter, such as Indian meal, crushed oats, or wheat, bran, &c. As a milk, butter, and flesh producer, it stands unrivalled, owing to the heavy percentage of flesh-forming (nitrogenous) materials it contains. It should never, for this reason, be given to stock under one year old, except with the greatest caution and judgment; and should not on any account be used for cows on the point of calving, nor for a month after, as the milk in such cases is too rich, and brings

on diarrhœa (white scour) when given to young calves. The manurial residue of decorticated cotton cake is valuable; in fact, it stands without a rival for renovation and improvement of old laid grazing pastures. In the course of a couple of years or so, given in anything like liberal quantities, it has a marked effect, both on the quantity and quality of the herbage.

Undecorticated Cotton Cake is extensively made in England; in this case the husk and the kernel are ground together. The best qualities are manufactured from Egyptian seed, and command the highest prices. Even the best class of these shows but a poor analysis compared with decorticated cake.

Note the following analyses:—

	I.	K.
Moisture	11·24	12·16
Oil	6·54	6·74
*Albuminous Compounds	21·62	22·12
Starch, Sugar, and Carbonaceous Compounds	55·97	54·05
Phosphates	4·63	4·93
Insoluble Matters	traces	traces
	100·00	100·00
*Containing Nitrogen	3·46	3·54

The cake is, however, largely used in some districts. In early spring, when the grasses are young, it has a good effect, owing to the tannic acid it contains preventing looseness of the bowels in cattle, but it should always be used fresh. Therefore, *large stocks, however cheap, ought never to be stored over July, August, and September, for, during these months, myriads of insects are passing through their various stages of life, and seeking winter shelter for the reproduction of their species for another year.* When cakes become mouldy, they are very dangerous to stock, often producing blood diseases and death. Serious fatality arises from the use of cake of this description, which may lead to lengthy and unpleasant litigation, the case going against the manufacturer or seller, when the feeder is to blame for having too big a stock at the wrong time of the year, and allowing it to mould; therefore mouldy cakes of any class should never be given to stock.

All the foregoing cake analyses are by Professor Sibson, F.C.S., London.

Palm-nut Cake and Meal are prepared from palm fruit, which is ground, heated, and pressed, in a somewhat similar manner to linseed and cotton cakes. Cattle do not take very readily to either of these articles, but when once they acquire the taste, they thrive and do well. As milk and butter producers, palm-nut cake and meal are great favourites with many dairymen and farmers, when used in combination with other feeding materials.

Cocoa-nut Cake and Meal are made from the dried fruit or flesh of the cocoa-nut, which is reduced to a rough powder by machinery, and treated in much the same way as seeds are in the manufacture of other cakes, the great object being to extract the oil which is very valuable, and, unlike the others, is solid, resembling lard at ordinary temperature. The residue is a light-coloured cake, having a delicious smell and nutty flavour, and is much relished by all kinds of stock. It is especially valuable for dairy cattle and breeding ewes in frosty weather.

Herewith the analyses:—

	L.	M.	N.
Moisture	9.60	8.40	9.12
Oil	9.68	11.36	11.50
*Albuminous Compounds	20.62	20.37	15.50
Carbonaceous Principles	37.23	40.61	36.45
Phosphates, &c.	5.43	5.00	23.69
Fibre	15.34	12.97	
Insoluble Matter	2.10	1.29	3.74
	100.00	100.00	100.00
*Containing Nitrogen	3.30	3.26	2.48

L.—Analysis of a sample of **Egyptian** Cocoa-nut Cake, but not so rich in oil as English-made cakes.

M.—Analysis of Cocoa-nut Cake, Smith & Co.'s, Kent St. Oil Mills, Liverpool.

N.—Analysis of Palm-nut Cake, Smith & Co.'s, Kent St. Oil Mills, Liverpool.

Rice Meal.—There is always a considerable quantity on the markets. It forms a fairly good cattle food, and is extensively used in many districts, but great caution is needed in its purchase, as it can be bought at almost any price, and is frequently adulterated and damaged. It is more used in making fancy mixed meals and cakes than as a feeder by itself.

Compound Cakes and Meals.—While believing in a mixed food, I do not advocate the purchase of prepared fancy-named mixtures. The articles used in their composition may be of an inferior, *mouldy*, or doubtful character. There is nothing equal to the simple cakes, crushed and mixed with maize, meal, or home-grown ground corn, when required, and, if necessary, flavoured with powdered locust bean or fenugreek. If mixed foods are wanted, the best way is to buy the materials and mix them to your own satisfaction. It is important, however, to be careful, not to overbalance the materials. One part of albuminous or nitrogenous matter to four or five fat-forming matter, is the most suitable mixture for feeding cattle. I have seen evil effects, such as splenic apoplexy, anthrax, and fatty degeneration of the liver, follow the consumption of badly-balanced foods. In buying fancy compound mixtures care is necessary, for in large seaports, such as Liverpool, Leith, &c., there is always a great amount of damaged grain, corn, cakes, &c., These are sold by auction, and have to be placed somewhere. There are first, second, and third-class damaged: the first and second might be dressed and sold as a good, sound article; the third-class is assorted, ground, and made up into compound mixtures, flavoured with aromatics, and sold on the market as first-class feeding cakes and meals. I have every reason to believe that these sorts of feeding stuffs are largely responsible for many of the outbreaks of disease amongst cattle and pigs, and whether the bacillus of anthrax is preserved in cotton-seed cakes, even after they have been subject to heat and high pressure, I would not offer any definite opinion, but it is within my knowledge that in wool shoddy, which had been subjected to great friction and heat in the polishing of tin plates, no fewer than sixty distinct species of foreign plants were found

growing on the refuse heap. If such a variety of vegetable life could be found in wool shoddy after the friction to which it had been subjected, I do not see why the bacillus of anthrax, if it were in the woolly film attached to the cotton seed at all, might not survive the crushing.

The meal of the *Indian Pea*, already referred to, as well as that of *castor oil beans*, have been found mixed in these compound cakes and meals, which, when used, have had fatal effects on both cows and sheep. I am afraid that, in many of these instances, the deaths have been attributed to anthrax, and so caused great inconvenience, through restrictions being put on preventing the removal of stock.

Bran.—The feeding properties of the husk of wheat, although extensively used, are looked upon as very limited. It is a well-known fact, that if a horse, in regular work, receives two or three bran mashes in succession, it will be severely purged. This is due to the exciting effects set up in the lining membrane of the bowels, by the indigestible nature of the bran; and yet, a good warm bran mash is considered the best food for a tired and starved animal. While a great many cattle-feeders consider the money wasted that may be laid out on bran, I am satisfied, from long observation and practical trial, that it has a very important and highly beneficial effect in the assimilation of food. Bran, or husk of wheat, as already stated, from its indigestible nature, has a stimulating effect on the glands and absorbents studded all along the intestinal tract, exciting them into greater action, and, by these means, more nutritive material is taken up and assimilated from the food given with it, than would otherwise be done if the bran were withheld.

Below is given the analysis of a good sample of bran :—

Water	13.1
Gluten	19.3
Oil	4.7
Husk and a little Starch	55.6
Saline Matter (Ash)	7.3
	<hr/>
	100.0
	<hr/>

EIGHTH LECTURE.

THE CIRCULATORY SYSTEM.

THE organs of circulation comprise :—

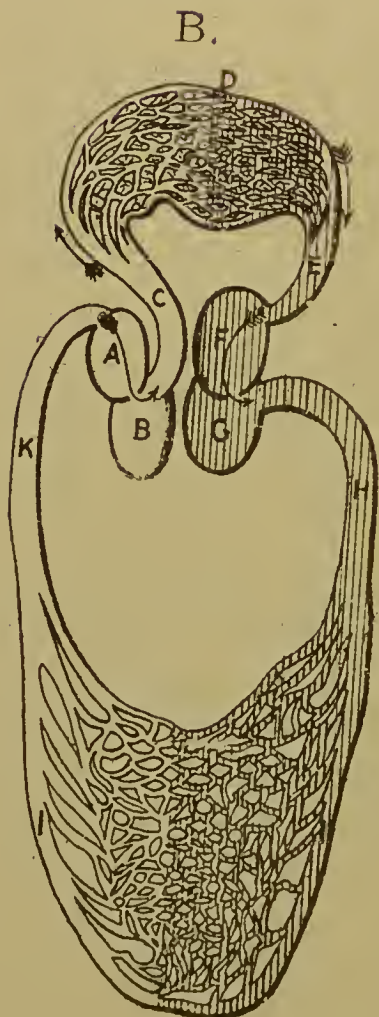
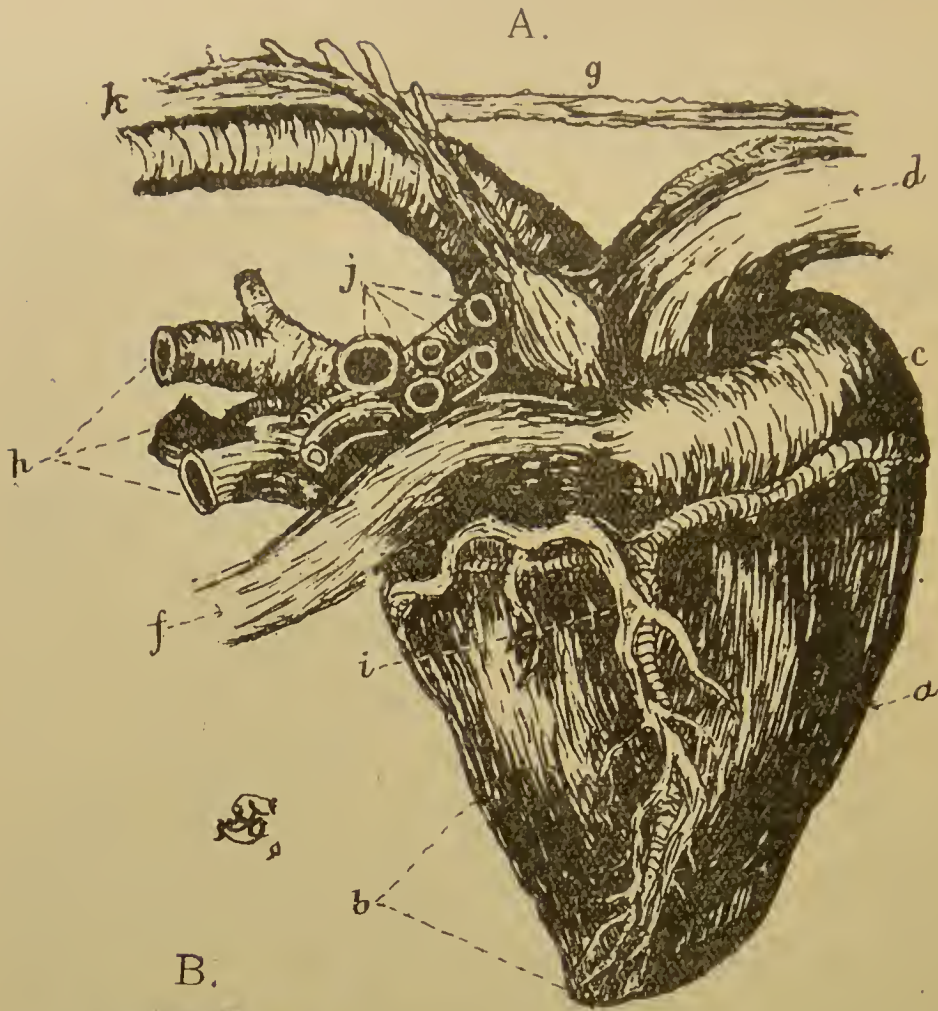
- 1.—The Heart.
- 2.—The Arteries.
- 3.—The Capillaries.
- 4.—The Veins.

The Heart is a reddish-brown-coloured, hollow, cone-shaped musculo-membranous organ, situated between the right and left lungs, in the middle of the chest, or thorax (the *mediastinum*), having a base upwards, a body, and an apex pointing downwards in a slightly oblique manner, inclining to the left side, and towards the sternum, or breast-bone. It is composed of involuntary muscular fibre, and is enclosed in a fine fibro-serous sac, or bag, called the *pericardium*, the surface of the heart being covered with a serous membrane—the *epicardium*.

In the horse and cow it is about eight inches in length from the base to the apex, and weighs from six to seven pounds. The walls on the right side of the heart are much finer and thinner than those on the left, whilst the walls of the left ventricle are about three times as thick as those of the right, and form the apex.

The heart receives its nutrient blood from the *coronary artery*, the blood being returned by the *coronary vein* into the right auricle.

Internally, it is divided into four cavities—*two auricles*, and *two ventricles*; both auricles and ventricles are divided by a partition—the *auriculo ventricular septum*; whilst the cavities are lined by a serous membrane, called the *endocardium*.



RIGHT SIDE OF HEART.—A.

- a. Right Ventricle.
- b. Left Ventricle.
- c. Right Auricle.
- d. Anterior Vena Cava.
- f. Posterior Vena Cava.
- g. Thoracic Duct.
- h. Pulmonary Arteries.
- i. Coronary Artery—Nutrient Vessel of Heart.
- j. Pulmonary Veins.
- k. Aorta.

CIRCULATION.—B. (GRAINGER.)

- a. Right Auricle.
- b. Right Ventricle.
- c. Pulmonary Arteries.
- d. Do. Capillaries.
- e. Do. Veins.
- f. Left Auricle.
- g. Left Ventricle.
- h. Aorta, terminating in Arteries.
- i. i. Systematic Capillaries.
- k. Vena Cava.

The auricles, being in the upper portion of the heart, form the base, and are separated from the ventricles by valves—the valve on the right side being in three sections, the **tri-cuspid**; while that on the left is in two, and called the **bi-cuspid**, or **mitral**.

On the inside of the auricles, chiefly in the appendix, are noticed fleshy elevations, called *musculi-pectinati*, while there is a depression on the auricular septum, which is the remains of the *foramen ovale*, through which the blood courses in fœtal circulation.

Inside the ventricles are fleshy columns — *carneæ columnæ* — from which run white fibrous cords, called *chordæ tendineæ*, to be attached to the auriculo-ventricular valves, their purpose being to guard and assist in opening and closing the auriculo-ventricular passage during circulation.

Into the right auricle, we have opening the *anterior* and *posterior venæ cavæ*, and the **coronary vein**, while the four pulmonary veins open into the left auricle.

The Pulmonary Artery arises from the right ventricle, and carries venous blood to the **lungs**, to be oxygenated, while

The Pulmonary Veins bring back the purified blood from the lungs to the left auricle of the heart, and generally consist of four branches.

It will thus be seen that the *pulmonary artery carries venous blood*, and the *pulmonary veins, arterial*.

Inside the aorta and pulmonary artery, just as they leave the heart, are the *semi-lunar valves*, three in number; on the free edges of these are small fibro-cartilaginous bodies, called the *corpora aurantii*; these valves, like the other valves of the heart, are to prevent regurgitation of the blood.

The Aorta rises from the front and upper part of the left ventricle, and is the main stem of the arterial circulation. The common aorta is about two inches long, when it divides into two great branches, one (the anterior) going to supply the head, neck, and fore

extremities, while the other (the posterior) proceeds to the hinder parts of the body and limbs, finally dividing and subdividing into the

Arteries—the vessels which convey the blood from the left side of the heart to the various portions of the body. They are very dense, and elastic, having three coats—internal, or serous; middle, or contractile, consisting of non-striated muscular fibre, and elastic tissue; and external, of areolar structure. The arteries anastomose frequently with one another, and finally terminate in the

Capillaries—a system, or network, of minute vessels, constituting the connecting medium between the arteries and veins. These are very small, being about $\frac{1}{3000}$ of an inch in diameter. It is through their thin walls that the changes between the blood and tissue take place; the nutrient material is given out, and the worn-out products are taken up and passed on by the veins, to be thrown off by the various excretory organs.

Veins are the vessels which return the blood from the system to the right side of the heart. They, like arteries, have three coats, which, however, are not so dense, strong, or elastic, and are, moreover, provided with pouch-shaped valves, to prevent the back-flow of the blood. The walls of the bloodvessels are nourished by means of small vessels, called the *vasæ vasorum*, and *venæ venorum*.

The Portal Vein forms a separate circulatory system. It commences in the sub-lumbar region, being formed by various vessels. It carries blood, charged with material newly absorbed from the food, through the walls of the stomach and intestines, and conveys it to the liver.

The Circulation of the Blood.—Through the medium of the large *venæ cavæ*, the dark venous blood reaches the heart, entering the right auricle, and passing through the opening guarded by the tri-cuspid valves into the right ventricle. From thence it is driven, by the contraction of the walls of the ventricle, into the pulmonary artery, and carried to the right and left lungs, where it gives off carbonic acid gas, and becomes charged with oxygen. This changes its colour from a dark brown to a bright scarlet. The blood is then

returned by the pulmonary veins to the left auricle, then through the passage guarded by the bi-cuspid valves into the left ventricle, where it is forced into the aorta, then through the arteries all over the body, carrying to the various parts nourishment, as well as oxygen, to keep up animal heat; then, when loaded with impurities, it is again returned by the veins to the right side of the heart. Thus we have a double circulation, the right side being the **venous**, or **pulmonary**, while the left is the **arterial**, or **systemic**.

By the action of the heart, the blood is forced into the aorta and pulmonary artery through the contraction of the ventricles; this causes the arteries to dilate, and this dilatation, running in the form of a wave, pressed forward by the contraction of the arteries, and the force behind it, constitutes

The Pulse, which corresponds to the beats of the heart.

Horse's pulse beats from 38 to 43 times per minute.

Cow's	„	„	50 to 60	„	„
Sheep's	„	„	75 to 80	„	„
Pig's	„	„	70 to 80	„	„
Dog's	„	„	80 to 90	„	„

The Blood is a dense red fluid, of two kinds :—

- 1.—*Arterial blood*, of a bright scarlet colour.
- 2.—*Venous blood*, of a dark brownish-red.

The difference in colour is due to the relative quantities of oxygen in each.

Blood consists of—

- 1.—*Liquor sanguinis*, or *plasma*.
- 2.—*Red corpuscles*—of which there are computed to be between two hundred and four, and two hundred and five trillions.
- 3.—*White Corpuscles* — in number, estimated to be in proportion to the red as 1:335.
- 4.—Extractive matters.
- 5.—Mineral matter.

The liquor sanguinis contains the fibrin elements, albumen, alkaline salts, and water.

The Red Corpuscles are disc-shaped, and without nuclei; they are said to be about $\frac{1}{4000}$ of an inch in diameter; it is to them that the red colour of the blood is due, containing, as they do, a small quantity of iron in *hæmoglobin*, which is the oxygen-carrier to the tissues. The red corpuscles, when seen singly, are of a yellow colour, and float in the middle of the blood stream, moving along more rapidly than the white ones.

The White Corpuscles (*leucocytes*, or *phagocytes*, as they are also termed), are very remarkable bodies, which float more slowly along the sides of the vessels, in what is called the still stream. They are larger than the red corpuscles, and seem to have a sort of life in themselves. It is thought that they have the power, and perform the function, of killing the disease germs which attack the body.

These germs—microbes, or bacilli—surround us in millions, and enter the body by food, water, and air; and were it not for the watchful guard which these little soldier-like corpuscles keep, ready to pounce on any intruder, the latter would speedily over-run the system, and destroy mankind and animals wholesale. Occasionally, indeed, when the body has become relaxed, and the leucocytes are unable to do their work, the microbes get the upper hand, and produce whatever disease they predispose to, as scarlet fever, &c., and when once those germs get a footing in a human being, or in an animal, they develop and become more powerful, attacking and infecting large numbers. Then, after passing through a vast number of subjects, and going through several stages, they lose potency, or the bodies through which they have passed may be rendered immune, and freed from subsequent attack. The epidemic dies out, and the germs remain latent in our midst, until, in time, they seem ready for a fresh attack, seize hold of another relaxed constitution, and again re-establish their virulence. At least, from the various periodical outbreaks of specific diseases, and the immunity given by inoculation, one is led to think such is the case.

There is still some doubt as to the origin of the white corpuscles; it is thought by some that they are formed in the lymphatics; by

others, that they are made in the spleen; while others think that they come from the middle parts, or medulla, or marrow of bone. May it not be possible that they arise from the wearing and fleecing off of the internal cell walls of the lymphatics and bloodvessels, just as the scales are rubbed, or fall, off the skin; and that by the friction produced by the trillions of these little corpuscles, in their rapid motion, rubbing against one another, and against the sides of the bloodvessels, combined with the heat of the body, an electrical property, seems to be generated in them? Thus the fluidity of the blood is maintained, and the power given, not only to take up the cast-off, or waste materials of the body, but also—as is thought by some—to attack the microbes and germs that may have gained access to the system. By these means the white corpuscles become charged with hæmatine and globuline, converting them into red corpuscles, which, after doing their duty in the blood stream, as carriers of oxygen, are eventually stored in the spleen, where they are broken down, and, during digestion, carried by the splenic vein—a tributary of the portal vein—to the liver, and there assist in the formation of bile.

The salts in solution in the blood are salts of magnesium, soda, and potash, chiefly; of these, by far the most plentiful is common salt, or chloride of sodium, of which the ash of human blood is said to contain as much as 54 %. This substance—salt—must therefore play an exceedingly important part in the body, and from its presence and great germicidal properties may, doubtless, assist the leucocytes.

The Clotting of Blood.—When blood is drawn from the body, it does not remain fluid, but, in a short time, forms into a jelly-like mass. Then, if left to stand for a few hours longer, it separates into (1) the *Crassamentum*—a firm red clot, consisting almost entirely of red corpuscles, entangled in a network of *fibrin*; and (2) the *Serum*—a clear, pale, straw-coloured fluid in which the clot floats.

In the living body—except in an abnormal case, in which a clot is formed in the living body—the fibrin is present in the blood in a fluid condition, giving plasticity to the blood, and holding the constituents in their proper places.

DISEASES AND DISORDERS OF THE CIRCULATORY SYSTEM.

Heart Diseases.—These, though of frequent occurrence in the human subject, are not so common in the horse. The cow, however, is more often affected, generally with traumatic heart disease, from foreign bodies, such as pins, needles, &c., finding their way to the heart from the stomach.

Heart affections may be said to be of two kinds:—1.—*Organic*; 2.—*Functional*. The latter may arise from a variety of causes, but is principally due to derangement of the stomach, or, more particularly, of the liver. The exact cause should be ascertained, and the treatment framed to suit it.

Organic disease may be from fatty degeneration, and complicated with the same change in the liver, but the organic disease most frequently met with is

Hypertrophy, or *enlargement* of the heart. On account of the different causes, this is not so readily diagnosed. A horse thus affected has a small, quick, irregular pulse, and sometimes pulsation is noticed in the jugular vein—up the neck; but the greatest symptom of all is the extreme shortness of breath. This is especially noticeable when a horse has a short, sharp canter, or when bringing a load up a hill; in the latter case, it has to stop every few steps, when the heart can be heard to beat with a fluttering, irregular sound, and the pulse is scarcely perceptible. Treatment is of little avail; but the animal may live a long time, and do a lot of farm work, so long as it is slow and easy. As the legs are inclined to swell, preparations of iron, digitalis, and potass, will assist materially in giving tone. From its obscurity, this affection is of vast importance in buying horses, it being highly necessary in examination as to soundness, to notice the action of the pulse and heart.

Acute cases of diseases of the heart, and its covering—the **pericardium**—are frequently associated with severe attacks of *influenza*, *pink-eye*, *rheumatic affections*, &c. Here the covering of the heart becomes intensely inflamed, producing fibrinous deposits, and effusion of water into the chest, and pericardial sac (*hydrops-pericardii*). These cases are so complicated, and so rapid, that they require early and judicious treatment, as they are frequently fatal.

A horse fed up for sale on too much starchy matter, as boiled wheat, potatoes, &c., and having little or no work—particularly a stallion—is subject to general congestive febrile attacks, affecting the whole system, when, from the hurried circulation, fibrinous strings form round the tendinous cords in the ventricles, and accumulate so fast that the animal dies from stoppage of the heart's action by this *ante-mortem* clot of fibrinous, fatty-looking material blocking up the passages through the heart and the large vessels.

In the old farrier days, when bleeding was so much run on, these cases were bled four or five times in twenty-four hours. This repeated bleeding tended to increase the fibrinous matters in the blood, so that instead of curing the animal, the operators only assisted in killing it, and on *post-mortem* the verdict was that it had died from *grease at the heart*.

These cases require prompt treatment. If bled at all, it should only be once, and at the very first. The animal ought to be kept quiet, and given plenty of ammoniated nitrate water to drink.

The Cow suffers more from heart diseases than the horse, owing to foreign bodies passing through the walls of the stomach to the heart. The animal may go on feeding and doing well, without the slightest symptom of anything being amiss, until one day it is found dead—*post-mortem* revealing the cause to be a needle, wire, or some such body, sticking in the heart, or its covering.

Again, in other cases, the animal begins to lose flesh and milk, feeds badly, rarely chews the cud, and has all the symptoms of a "*pinner*," with a dry, ticklish, barking cough, standing with the hind legs down in the gangway of the byre, the belly tucked up, and sides dropped in, the breathing short and slightly quickened; but the most

confirming symptom is the jugular vein being greatly enlarged, sticking out as thick as the handle of a hay-fork, with a wavy pulsation in it. As the case progresses, watery swellings are seen under the jaw, and on the lower side of the neck and dew-lap, while the pulse is so small and quick as to be scarcely appreciable. On applying the ear to the flat of the sternum, just behind the elbow, the heart can be heard splashing in the water, with a peculiar tinkling running sound. This symptom may be due to some foreign body sticking in the pericardium, or to chronic inflammation of the pericardium from other causes—one prominent cause being the retention of the second cleansing, the flow of which may have been checked by east wind chills, or from too early removal of the cow after calving, &c. The animal at first falls slightly off its milk and food, and the complaint steals on gradually, until it ends in hydro-pericarditis, as already shown.

A Young Animal, under twelve months old, when fed on too nitrogenous a diet, such as decorticated cotton cake, suffers from *congestion of the lungs and heart*. It has a dry husky cough, head stretched out, and held low, *jugular vein full*, quick breathing, with a sharp grunt, rapid movement of the flanks, and foaming at the mouth, generally. At the first glance, the case resembles quarter-ill.

These cases usually terminate fatally, and the animal should be slaughtered early on. Cotton cake, of any sort, should never be given to an animal under twelve months old.

Thrombi, or plugging of the bloodvessels, are occasionally met with in the horse. They generally make their appearance when an animal has had a very quick journey, and is pulled up for a time. On re-starting, it is found to be intensely lame—in fact, it can scarcely move—on one of its legs, usually a hind one. The limb has all the appearance of being paralyzed, only the animal can move and stand on it, but with great difficulty and pain, and perspires freely. As the case proceeds, the veins are seen to be varicosed, the leg begins to swell, and is very painful to the touch. There is a great deal of constitutional disturbance present, the animal taking little or no food.

These cases take a long and tedious time to recover. The acute febrile symptoms must be combated with mild laxatives and sedative medicine. There is also a chronic form of this disturbance, which is accompanied by swelled legs, varicose veins, and a peculiar clumpy action of the leg. Diuretics, with iron tonics and long rest, answer best for this.

Phlebitis, or inflammation of a vein—more particularly the jugular vein—is not so often seen nowadays, and is generally caused by too frequent or unskilful bleedings, more particularly in over-fed animals of a febrile tendency. If in the jugular, the vein is noticed to be very much swollen from the opening up to the animal's head, with a mattery discharge from the wound.

When first observed, a smart blister applied over the enlargement generally has the desired effect.

Some cases, however, are met with, when it is necessary to pass a seton along the engorged portion of the vessel, and to tie up the animal short to the rack. Nearly all cases terminate with obliteration of the vein. This requires careful attention in examination for soundness.

Azoturia, or Nitrogenous Urine, is due to an overloaded state of the system, and occurs usually amongst horses which are too well stall-fed, and have too little work or exercise; it is more particularly met with after a spell of frost, during which time the animals have had a term of enforced idleness, without the necessary care and attention being paid to their dieting, as a rule. Mares are more acutely affected than horses. On the animal being taken out of the stable, it seems to be possessed of more life and high spirits than usual, and rushes off on its journey in great form, but does not proceed far—generally from half a mile to two miles—before it begins to flag, wants to stop, and breaks out in a most profuse perspiration; the back becomes arched, and the hind legs stiffen, &c. Though the difficulty is great, the animal should be got into a stable, when, if a mare, it may throw itself down, and commence to strain, as if in the act of foaling, ejecting from its bladder large quantities of dark-brown coffee-

coloured urine. - A horse, on the other hand, generally stands leaning against the stall, or wall, pressing its head in the manger, perspiring freely, breathing quickly, with a full, strong, corded pulse, while the eyelids and other visible mucous membranes are highly injected. Quantities of the peculiar coffee-coloured urine are passed at intervals with great straining.

As to the treatment, owing to the sudden onset and severity of the attack, I know of no other complaint affecting the horse for which bleeding answers so well, or has such a decided, beneficial action, unloading, as it does, the overcrowded system sooner than anything else; from six to ten quarts of blood may be taken, according to the size of the animal, after which, a good dose of linseed oil (1 to 1½ pints) should be administered.

If the attack is allowed to run its course, the animal, as a rule, dies, or, if by chance, it may fight out, it is worthless for a very long time, the muscles of the loins being infiltrated with blood, from rupture of the muscular tissue and bloodvessels, caused by the excessive straining.

To prevent the occurrence of this troublesome disorder, animals should be regularly exercised daily; if this is not practicable, they must be put into a loose box, and lightly fed, as long as their period of idleness lasts.

Purpura Hæmorrhagica, or Purple Bleeding.—This, most frequently found in the horse, is an eruptive, non-contagious, febrile affection, which follows in the wake of some debilitating disease, such as catarrhal fever, influenza, strangles, diabetes, &c., and is of more common occurrence in town than in country practice.

When an animal is evidently on the way to recovery from a severe attack of influenza, or some such disease, it may all at once be found with swelled legs, eyelids, nose, and mouth, and patchy swellings all over the body, while, on closer examination, dark purple blotches are seen inside the nostrils. The breathing becomes much

quicker, and the pulse is small and fast, while there is a yellow discharge from the nostrils. Occasionally the swellings about the head are so large, that the breathing is oppressed to such an extent that suffocation is threatened, and tracheotomy must be performed, while the limbs may become so much swollen, that the animal can scarcely stir, and has at length to be supported on slings.

When first observed, the horse should at once be put in a loose box, where it can have a plentiful supply of fresh air, and, when necessary, ought to be put in slings. Milk, linseed jelly, eggs beaten up in milk, may be given, as well as green food, and boiled barley, if it has any appetite.

All the food must be light, and easy to digest. No purgatives should be administered. Chlorate of potash, in 2 drachm doses, every four or six hours (given in drinking fluids) has a very beneficial effect.

Influenza, or Pink-Eye.—This is described under “Respiration.”

Urticaria, Blains, Howkes, or Nettle-Rash.—This is another blood affection of a non-contagious and non-febrile type, analogous to what is termed “musselling” in the human subject. It is characterized by the sudden springing up of patchy elastic swellings all over the body, which, however, cause little or no distress to the animal, and may disappear quite as suddenly as they came. The cause is generally traceable to some strange food, or quality of food, being given to an animal, such as the first feed of new grass, new hay, or oats, Indian corn, &c. For the horse, from 1 to 2 ounces of *bi-carbonate of soda*, in $\frac{1}{2}$ pint whisky and 1 pint water, given when first observed, will generally be found to have the desired effect.

In the cow this complaint is most frequently met with during the spring months, when stock are changing their quarters. The head, eyes, ears, neck, and the base of the tail are swelled up, while the skin all over the body feels much thicker and harder than usual. The swellings, at times, are so extensive, in the region of the neck and head, that the animal foams at the mouth, and shows all the symptoms of choking.

Formerly, cattle-dealers and drovers, on observing a case, used to cut the partition dividing the nostrils, and let it bleed, while farmers used to get very excited, and were in a great hurry to have the animal bled, thinking that they could not take too much blood away. By this heroic and foolish treatment, I have seen many subjects bled to death. All the treatment necessary is to give the cow a wineglassful of turpentine, in a pint of linseed oil, or milk ; or 2 ounces of bicarbonate of soda may be given in $\frac{1}{2}$ pint whisky and 1 pint cold water. After this the animal should be left alone, and a little patience exerted on the owner's part.

Lymphangitis, Weed, Shot of Grease, or Monday Morning Complaint, consists of inflammation of the absorbent vessels, and most frequently affects the hind legs of horses; occasionally, however, it is met with in the fore legs.

It generally appears on Monday mornings, after Sunday's rest—and, perhaps, over-feed—affecting heavy horses, more particularly the sluggish, gummy-legged ones. From the suddenness of the attack, and the extreme pain evinced on touching the affected limb, it, to my mind, greatly resembles gout in the human subject.

Nineteen people out of twenty are in the habit of calling this a "*shot of grease*," whereas, in reality, there is no grease about it, grease being purely a skin disease.

In some cases, the attack is ushered in by a shivering fit, while in others, the first symptom noticeable is a sudden and extreme lameness in one leg, on touching which great pain is evinced, even before any swelling makes its appearance, while patches of sweat may be observed on the limb. The large vessel running up the inside of the leg soon begins to enlarge, as well as the gland in the groin, while excessive lameness and pain accompany any attempts to move. General swelling of the limb then takes place, and the pain diminishes a good deal on its appearance, losing most of its acuteness. In some cases there is a great amount of accompanying constitutional disturbance, but in others, very little or none is observable.

In very acute cases, where the animal is suffering great pain, taking from four to six quarts of blood from the neck (jugular vein) gives great and quick relief. Some people bleed from the toe of the affected limb, but this I do not approve of. The treatment I adopt, and which I can strongly recommend, is to put a bandage-syme—made of soft meadow hay, not too tightly twisted—round the limb, commencing at the foot, and rolling lightly and loosely round, up to the thigh, and when once in position, soaking it well with several pailfuls of cold water, which must be repeated every three or four hours. In scores of cases, I have seen the animal get great relief from this treatment in less than an hour. Linseed oil—from 1 to 1½ pints—may be given, followed up by nitred water to drink. When the pain has gone, the swelling is best reduced by gentle exercise. Iron tonics, with diuretic medicine, may be given every night with much benefit. In very excitable cases, aloes balls should be used with extreme caution. (*See Inflammation of the Bowels, page 81.*)

Animals once affected are subject to subsequent attacks, and may ultimately end with a chronic thick leg, which, in some cases, gets to an enormous size; this is called

Elephantiasis, and consists of an abnormal thickening of the tissues beneath the skin of a chronic nature. The animal may continue to do slow work on the farm, feeding and doing well, but the leg is very unsightly. Liniments of a slightly stimulating nature may be used. I have had best results from applying a cold-water hay bandage every night. Tarring the limb, and giving a winter's run at grass, have a wonderfully good effect. I have tried blisters, setons, &c., without any avail.

Swelled Legs and Sheath.—During the winter months, stalled animals are frequently seen with thick legs, and, occasionally, the sheath becomes swollen, and pendulous. This is generally due to the want of condition, or to giving too much boiled food of a “slushy” nature, such as boiled turnips, or potatoes, and cut corn sheaves. Soft unconditioned hay, or oats, will have a similar effect. If the

food be at fault, it should be changed at once, and the sheath well washed out with soap and water, when iron tonics, combined with suitable diuretics, will soon remedy the mischief.

Nearly all epidemic or epizootic diseases are more or less affections of the blood, caused by small solid bodies, called microbes, or bacilli, which grow and multiply with great rapidity in the blood, and produce the several various diseases which they excite, just as turnip seed and clover seed produce turnips and clover respectively—plants very distinctive from one another.

Anthrax, or Splenic Apoplexy.—Although a disease of the blood, it has already been noticed under “Digestive Organs.” (See page 104.)

Black Quarter, or Quarter-ill, is a disease of the blood, localizing itself in various parts of the body, particularly the limbs—one or more. It is most frequently seen in young animals, from six months to two years old; but even those older are by no means exempt. In young stock, it is invariably fatal, while aged animals occasionally make good recoveries.

Black-quarter is not now of nearly so common occurrence in the North of England as it was some years ago; this is owing to the better sanitation and improved mode of feeding now adopted, not allowing the animals to lose their calf-flesh, but feeding them steadily on. The disease is regarded as a species of **anthrax**, and is called **symptomatic anthrax**; but there is a decided *post-mortem* differentiation present, in that the blood of an animal dead of anthrax proper, *will not coagulate*, while that of an animal dead of quarter-ill will.

The first symptoms to be noticed are, the animal seems very languid, breathes quickly, and hangs its head, while the white of the eye has a *peculiar, pale, cold, steely hue*. Lameness in one of the limbs may also be shown.

On examining the body, the confirming symptom is found, namely, a puffy swelling, which, on passing the hand over, gives a

crackling sound and feeling. All sorts of remedies have been tried, but I never knew a case of a young animal recovering when once attacked. In adult cases, I have had most success with 1 ounce hyposulphite soda and 1 ounce charcoal, given every six or eight hours, in water; and 10 to 15 ounces linseed oil every other day. The temperature in all the cases ranged from 104° to 106° for seven to ten days; little or no food was taken, while the affected parts made very slow recoveries.

Numerous *preventive* measures have been suggested and tried for this affliction, such as tablespoonful doses of turpentine in $\frac{1}{2}$ pint linseed oil twice a week; $\frac{1}{2}$ ounce doses of saltpetre, in 1 pint water, at like intervals, &c.; but the best preventive I have found, is to insert a seton on one side of the dewlap, in September or October. I have treated some hundreds in this manner, and yet have never seen one animal which had been setoned become affected with black quarter. A new preventive, now recommended, is inoculating the young animals with some of the fluid from the diseased parts of an affected beast. This is a very delicate operation—the instrument must be scrupulously clean, and the fluid must be injected direct into the jugular vein, which has to be dissected out for this purpose, for were a little of the fluid to get into the tissues beneath the skin, it would be the means of killing the animal. This, then, must be a very risky, as well as a tedious, operation, and I don't see how it can be an improvement on the old seton, with the facts before named. The best plan, however, is to keep the animals indoors until they are twelve months old, giving them good lodgings, and nutritious food, such as linseed cake, crushed oats and bran, with a little salt. Were this treatment followed out, very little, if any, black quarter would be seen.

Rinderpest, or Cattle Plague, is an imported disease, of a specific contagious typhoid character, running its course in a very short time. The noticeable symptoms consist of elevated temperature, quick breathing, pulse scarcely perceptible, watery discharge from mouth and nostrils, drooping head and ears, trembling all over

the body, coat on end, and dirty eruptions in the mouth and vagina. Death is the invariable accompaniment very soon.

This disease is under the Contagious Diseases (Animals) Act, and really is of a very contagious and infectious nature. Happily, however, it has not visited our shores for some time.

Foot and Mouth Disease, or Murrain.—This is a contagious, eruptive, vesicular, febrile disease, affecting the mouth, feet, and udder, with small eruptive vesicles, which burst, and form ulcerating sores. Some cases are of a more acute nature than others; and, again, we may have the mouth attacked, and the feet free, and *vice-versa*. It affects cattle, sheep, and pigs—young pigs, at times, suffer severely.

The most prominent symptoms are saliva foaming from the mouth, with a *distinctive peculiar smacking of the lips and tongue*; the feet, occasionally are so sore, that the animal does not dare to move them, unless by twitching them up in a very abrupt manner, while the vesicles may be noticed as before named. It is some time since this epizootic was seen in this country, and it is now under the Contagious Diseases (Animals) Act. I have seen a great number of outbreaks, and although the disease did not prove so fatal, it caused a great loss to stockowners; especially was this so in dairy and breeding herds, the greatest loss being from calving cows casting their calves, and retaining the afterbirth, with sore udders, &c. When allowed to treat the cases, my great object was to try and assist nature in preventing the animals from aborting, and, for this purpose, I found that $\frac{1}{2}$ -ounce doses of chlorate of potash, given once a day, had a marvellous effect, as the following instance will show:—

On one occasion, when foot and mouth disease broke out, Sir Wilfrid Lawson's stock were considerably affected. In order that the disease might run its course speedily, I had all the cattle—affected and unaffected—brought together and put into the large park. These were dosed daily with chlorate of potash, given in bran mashes. The result of this treatment was, that out of about two hundred head of cattle, only ninety-eight took the disease, all of

which recovered; thirty-five of the affected cows were in calf, and they all went up to their full time—not one aborted; there were no sore udders, the calves were a fine crop, and both mothers and offspring did well. I have subsequently, on several occasions, tried the chlorate treatment with a like success.

Milk from the ailing cows quickly affects young calves and pigs, and this often fatally. It should never be given to animals until it has been well boiled, yet I have seen farm servants drink the milk fresh from such animals without any ill effects.

Red-Water, Black-Water, Muir-Ill, or Hæmo-Albumin-uria.—This disease is mostly found affecting the cow, yet I have seen two cases in the horse. In both of these subjects, the urine was of a dark, port wine colour, while there was little or no accompanying constitutional disturbance, the animals merely appearing dull and languid, with a great absence of appetite, for two or three days. Both cases readily yielded to saline laxative medicines, supplemented with boiled barley and bran mashes, containing a little salt. These animals had been grazed on pastures on which red-water in cattle was very prevalent; several of the cows being affected at the same time.

The disease, although due in the first instance to some peculiarity of the food, may be regarded as a deterioration of the blood, and the most striking symptom is the dark red or black colour of the urine, which is passed from the bladder in a slow, jerking, spiral stream, causing a bubbling froth as it falls on the ground; but there is no coagulation, or blood-clot, as is seen when there is hæmorrhage from the kidneys, ureters, or bladder. Formerly, this used to be a very common malady in the North of England; but improvements of late years, in the drainage, and the application of artificial manures, have gone far to make this a disease of rare occurrence. Twenty years ago, it was nothing uncommon to see ten or twelve cases in as many hours; but during the last fifteen years I have only had about seven cases in all.

I have never seen it follow parturition, and only twice have I seen it affect stall-fed animals, both of which attacks were very slight.

The lands principally affected are poor, undrained, shivery, gravelly pastures, and sour mosses, where the herbage is of a coarse acrimonious nature, in which acrid plants, such as tormentil, abound.

The malady generally makes its appearance in the summer and autumn months—August and September, especially—following a sharp heavy rain, after a spell of dry weather, when the rank grasses spring up rapidly, and the complaint is rife. Cattle bred and reared on these disease-producing soils are, however, more immune from attack than those reared on good land, and brought on to the bad to graze.

I am strongly of opinion that the disease is due to a want of saline matter in the food to balance the solids and fluids of the blood.

As already shewn, blood contains a large proportion of salt, and has, in fact, a soft saline taste. Now, on account of the acid nature of the food obtainable on these sour pastures, a sufficient amount of saline material is not conveyed to the blood, to preserve the equilibrium, between the solid and fluid parts, so that the watery portions, by endosmosis, pass through the cell walls of the red corpuscles, and so distend them, that they burst, and pass through the excreting water tubes—uriniferous tubes—of the kidneys, accompanied by the colouring matter of the blood, which they have thus liberated, into the urine, giving to it the red colour, and thus instituting the name of the disease.

The following analysis by Professor Sibson, F.C.S., London, was determined from a sample taken from a recent case I had:—

ANALYSIS OF "RED WATER" FROM COW.

Water.....	93'98
Solid Matter in Solution	6'02
Consisting of <i>Organic Matter</i>	4'48
Containing—	
Urea	2'40
Albumen	1'72
Extractives and Colouring Matter.....	0'36
And of Mineral Matter.....	1'54
Containing Sodium Chloride	0'71
Calcium and Magnesium Phosphates, con-	
taining Alkaline Phosphates	0'13
Potassium Sulphate	0'29
Other Saline Matters not determined	0'41

July 4th, 1893.

When first noticed, the animal is generally standing by itself in the field, with nose extended, and an anxious expression on its face ; when it moves, it is in a very listless fashion. On closer examination, the breathing is found to be short and quick, the pulse jerky, tremulous, and weak, the heart going at a great pace, and can, in many cases, be heard, beating loudly, at a distance of five or six feet from the side of the patient ; in milkers, the secretion is suspended ; the nose, eyes, mouth, udder, and vagina have a dirty yellow cast, while the lips of the vulva have a tight, puckered-up appearance, and the urine has, as already stated, its characteristic red colour. The animal will take neither food nor water, and, in the first stages, is affected with extensive diarrhœa. As the disease advances, all the symptoms become aggravated, but an obstinate constipation takes the place of the diarrhœa. In my opinion, this suspension of the action of the stomach and bowels is due to the deteriorated blood acting on the nerve centres, causing perverted action, or, in a degree, paralysis of the nerve fibres supplying the alimentary track, and the poor brute's condition becomes much more aggravated by the owner, on seeing this symptom, pouring into it large doses of relaxing purgatives, which only hurry it on to dissolution.

The treatment I recommend consists of giving from 14 oz. to 20 ozs. of common salt in 2 quarts of gruel, as soon as an animal is

observed to be affected, placing in front of it a large pailful of hay-tea or bran-tea, or cold water in which from 2 to 3 ozs. of hyposulphite or bi-carbonate of soda is dissolved, which must be renewed as soon as the patient drinks it. This should be followed by 10 oz. doses of linseed oil, to which is added 1 oz. sweet spirits of nitre, and 1 oz. balsam copaiba.

Should the bowels not respond, small doses of salts—from 3 to 5 ozs.—may be given along with 3 or 4 ozs. of warm cordials, such as sweet pepper, mustard, &c., in a quart of warmed ale, or in gruel containing $\frac{1}{2}$ pint of whisky, every six or eight hours. I have found this treatment to be very beneficial.

Prevention consists in dressing the particular grazing lands, every two or three years, with 10 cwt. rough crushed rock salt to the acre, while large lumps of rock salt should be scattered over the pastures for the animals to lick.

Liming, also, has a good effect on some land, but in my experience, salt is much better, and lands on which, in former years, the disease was intensely rife, have, by the application of salt, been entirely cleared of it.

Swine Fever, Red Soldier, or Blue Sickness—Measles.—This disease is of a typhoid nature, and affects pigs in different parts of the body. Sometimes the lungs and heart are the organs principally attacked, while at others, the stomach, liver, and bowels are implicated. It is said to be very highly contagious, and is classed under the Contagious Diseases (Animals) Act. To my mind, this malady is of two distinct types—*Simple and Contagious*—and I have met with quite as many, if not more, simple, isolated, or solitary cases, as contagious outbreaks. This, however, may be due to the influence of sanitation. Solitary, or simple cases, are much rarer in towns than in the country.

The first symptom noticeable is the listless, languid condition of the animal, and the *extreme pallor and coldness of the skin*. This latter symptom is very characteristic. The animal persists in lying, and has no inclination to stand up or walk about; in fact it is extremely

prostrated. In from twenty-four to thirty-six hours, red blotches appear on the skin (particularly the ears, and soft parts of the neck), which, in a short time, become purple, and even, in some cases, black. The breathing is quick and heavy, accompanied with a groan, or grunt ; there is no appetite, food and water alike are refused ; and, as a rule, obstinate constipation.

As the case progresses, however, diarrhœa generally sets in, and the animal may struggle on for from eight to sixteen days, finally dying suddenly, from failure of the heart's action. On *post-mortem* examination, the intestines are frequently found to be highly ulcerated, more particularly in the region of the ileo-cœcal valve—*i.e.*, where the small intestines join the large.

TREATMENT. is not allowed under the Act. Cases must be reported to the police, and the affected animals destroyed. Prior to the passing of the Act, however, I used to be very successful in treating the cases by giving, at the onset, from 2 to 4 ozs. olive oil with from 10 to 20 drops of croton oil, with warm-water injections every six or eight hours, tempting the animal to drink milk and cold water containing from 1 to 2 drachms bi-carbonate of soda, ordering perfect quietness. I had one case, many years ago, of a fancy-bred sow, which had a very severe attack ; and although the blotches on the skin turned black, it recovered. Strange to say, it received, altogether, above a drachm of croton oil at different times during its illness.

I may here mention, that for the administration of medicine to pigs—a very difficult matter in some—I find nothing to beat an old clog, with a triangular hole cut in the toe (*see illustration*), shoving the toe of the clog well into the pig's mouth, and pouring the medicine down the inside of the wooden sole.



NINTH LECTURE.

RESPIRATORY ORGANS.

FIRST, we have the **Nostrils**—right and left—which are divided by a cartilaginous septum.

Second, the **Larynx**, next the **Trachea**, or windpipe, with the **Thyroid** and **Thymus** glands, the **Bronchial tubes**, the **Lungs**, and the **Thorax**, or chest, the **pleura**, and **Diaphragm**.

The **Nostrils** contain four bones (two each), rolled up like a Turk's turban, and called the **turbinated bones**—*superior and inferior*. They are very fine, and covered with mucous membrane, their action being to clear and warm the air before it enters the windpipe, and for the latter purpose they are well supplied with bloodvessels.

The **Larynx** is situated at the back of the mouth, or throat, and is composed of seven pieces of cartilage, or gristle, of different shapes, which are so placed and joined that they are movable on one another, thus regulating the inlet and outlet of the air.

The cartilages are named the *thyroid*, *cricoid*, *arytenoid* (2), *epiglottis* and *cuneiform* (2). They are held together by ligaments, moved by muscles, and lined by a very sensitive mucous membrane.

The **Trachea**, or windpipe, is a long tube running from the larynx, to the lungs, where it divides into two bronchial tubes. It is made up of a number of circular pieces of cartilage, held together by ligamentous elastic tissue, allowing flexible movement of the neck, and is lined internally with mucous membrane.

The **Bronchial tubes** are two in number, one going to the right lung, and the other to the left. They divide and subdivide, ramifying through the substance of the lungs, until they are too small to be seen by the naked eye, giving off small branches and air-cells, forming the arrangement called bronchial lobuli, these divisions and subdivisions, resembling a tree with branches and leaves.



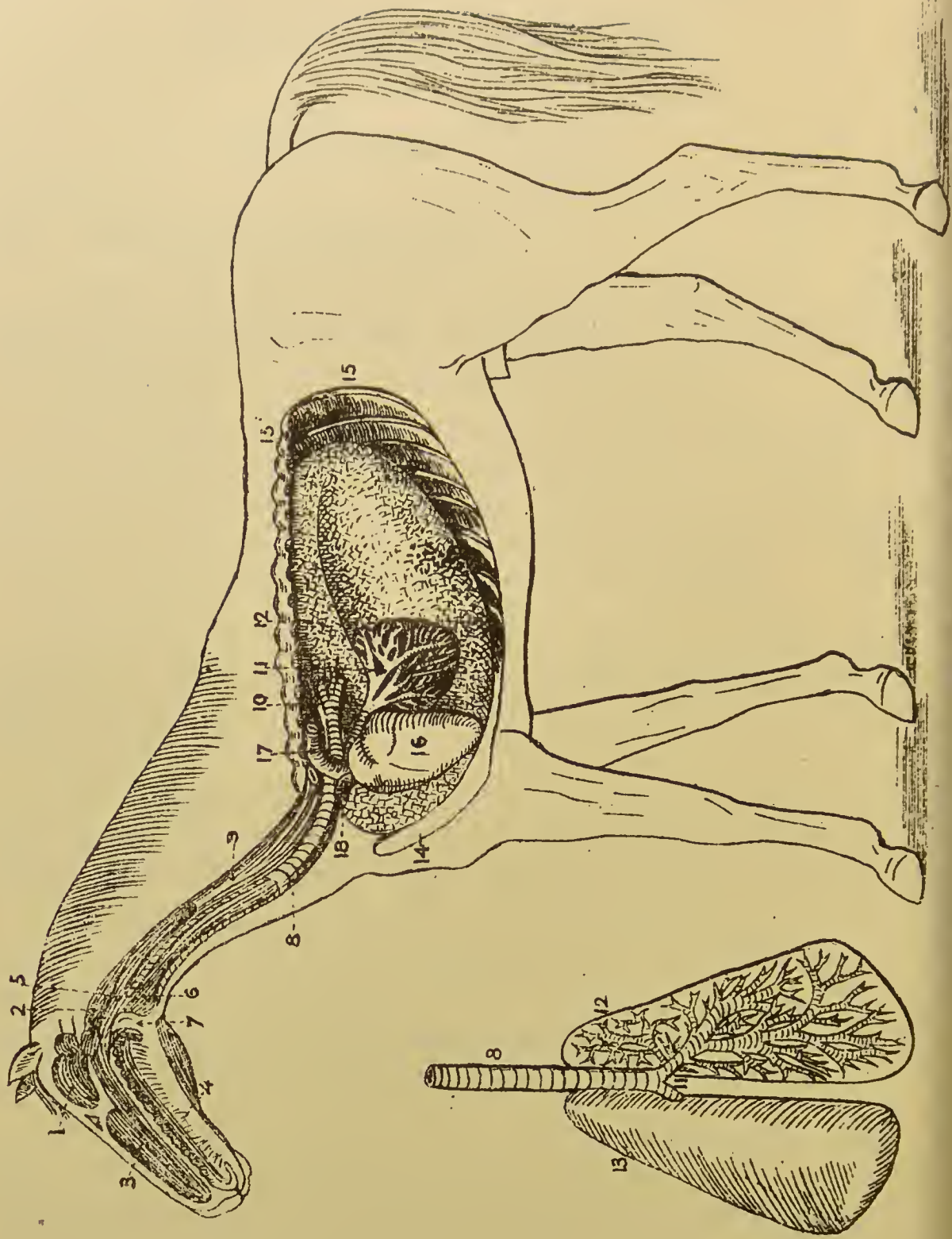


PLATE XXVIII. (GRAINGER.)

RESPIRATORY SYSTEM.

1. Cranial Cavity.
2. Guttural Pouch.
3. Nasal Cavity.
4. Tongue.
5. Pharyngeal Cavity (Throat).
6. Cavity of the Larynx.
7. Epiglottis.
8. Trachea.
9. Œsophagus.
10. Section of Left Bronchus.
11. Ramifications of the Right Bronchus.
12. Right Lung.
13. Left Lung.
14. Sternum (Breast-bone).
15. Ribs.
16. Heart.
17. Posterior Aorta.
18. Anterior Aorta.

The **Lungs**, or **lights**—right and left—are the principal organs in respiration; they are of a fine, soft, spongy texture, pale pink in colour, and very light and porous. Owing to the air-cells containing air, the lungs float in water. In the horse, the right is divided into three lobes, and the left into two; while in the cow, the right is divided into four lobes, and the left into two. The interlobular tissue is found in greater abundance in the cow than in the horse.

The *nutrient* bloodvessels are the **bronchial arteries** and **veins**. The *functional vessels* are the **pulmonary arteries** and **veins**, which are larger than the nutrient vessels; the latter arteries convey the blood from the right side of the heart to be purified, while the veins return it to the left side of the heart, as described in the lecture on "Circulation" (*page 133*).

The **Thorax**, or **chest**, is formed by having the back-bone for the roof, the breast-bone, or sternum, for the floor, the ribs and muscles for the sides, with the **diaphragm** behind, which is a strong musculo-membranous partition, separating the chest from the belly, or abdominal cavity. The inside of the thorax is lined by a fine serous membrane, called the

Pleura, which is reflected all over the inside of the ribs, extending from the back-bone to the sternum (forming the mediastinum, dividing the chest into lateral halves), and again over the heart and lungs.

Thyroid Glands.—These (two in number) are ductless, placed one on each side of the trachea, near its junction with the larynx—much larger in the young than in the adult animal.

The **Thymus gland** is a single body, found lying on the under side of the trachea as it enters the chest, is also large in the foal, and gradually disappear in adult life. The functions of these glands are but vaguely understood.

Respiration, or breathing, is the act by which a constant interchange of gases takes place between the atmosphere and the animal economy. Two distinct movements are noticed during respiration—

(1) inspiration, (2) expiration. Inspiration is the act by which the lungs become filled with pure air, for the purpose of purifying the blood, as described in the lecture on "Circulation." Expiration, on the other hand, is the act whereby the air in the lungs, charged with carbonic acid gas and other impurities, is expelled from the body. Each inspiration occupies about thrice the length of time taken up by an expiration.

The air which passes to and fro is called the "*tidal air*"; then we have the "*reserve air*," or the amount that can be voluntarily ejected after ordinary expiration; also "*complemental air*," the amount that can be taken in after ordinary inspiration; and "*residual air*," that which remains after forced expiration. Horses in large towns suffer more from derangement of the respiratory organs than those in the country, and are considerably worse to treat, owing to want of good fresh air and loose boxes. Pit horses are similar to town horses, their treatment is quite different to those in the country—the doses of medicine being only half the quantity, stimulating remedies succeeding best.

The horse is said by some to require 1,200 cubic feet of air space for healthy respiration. The following extracts from Colonel Fitzwygram's "Horse and Stables" show great variation in the area of different stables:—

Royal Mews	..	..	2,500	Cubic Feet per Horse.
Marlborough House Stables	..	..	1,700	" "
South-Eastern Railway Company	..	..	1,540	" "
London General Omnibus Company	..	..	820	" "
Cab-Horse Stables (average)	..	..	550	" "
Hyde Park Barracks	..	..	2,284	" "
Aldershot Cavalry Barracks	..	..	1,034	" "
Dublin Royal Barracks	..	..	560	" "
Woolwich (New Model)	..	..	1,793	" "



DISEASES OF THE RESPIRATORY ORGANS.

These delicate organs are extremely susceptible to derangement and disease in this ever-changing climate of ours, and all sudden chills and changes of temperature—especially from cold to heat—are very liable to have a baneful effect. Apart from purely atmospheric differences, we sometimes have horses subjected to, what I may term, artificial changes of temperature, and these are even more prone to be accompanied by injurious results, than are the natural. As a good example, a young horse is brought in from grass, for the first time, put into a stable and tied up, along with a number of other horses; or, it may be turned into a small, stuffy loose box, more commonly and more properly called a “*hull*,” or “*hole*,” where the doors, windows, and ventilators (if there are any) are closed to keep out the cold. All this is done with a perfect disregard to the climate to which the animal has been exposed outside, and the sudden change from the cold clear air to the warm air of the stable, which the breathing of the other horses rapidly contaminates, or to the cooped up “*hull*,” the atmosphere of which, is soon rendered impure by the animal’s own breathing, is very apt to produce an attack of congestion of the lungs. Young horses, then, when first brought in, should be placed in a well-ventilated airy box, say, for the first ten days or so, thus making the change more gradual. Again, young green animals, when sold and taken from the country into the town, should at first be put into a separate box or stable, so as to acclimatize before they are stabled with other seasoned horses.

The Nose is occasionally affected with **Polypi**, or long-necked tumours. These cause a peculiar, flapping sound in breathing, and must be removed by an operation.

Some horses are subject to small **Warts** covering the tip of the nose, which become very troublesome, but dressing with acetic acid, twice a week, will be found to answer well in most cases.

Broken Nose.—The bones of the nose may be broken, or delved in, by the horse running away, and coming in contact with a stone wall or other obstruction. The loose pieces of bone must be removed, and the parts dressed as a contused wound. If much hemorrhage is present, dashing cold water on the face, and plugging the nostrils with wool, tow or cloth, must be resorted to.

Catarrh or Colds.—The inside of the face is composed of sinuses, or cavities, which give both strength and lightness to the head, and have communication with the atmosphere. These cavities are subject to irritation and inflammation, and are affected in cases of common cold, which is of frequent occurrence in early spring, and may, at first, be called simple catarrh or cold in the head.

There may, or, may not, be much constitutional disturbance present, but the animal seems dull and languid, and watery discharges come from the eyes and nostrils. Immediately these symptoms are observed, and the horse does not take its food freely, it should be knocked off work, put in a nice, airy, loose box, clothed well, legs bandaged, and nursed for a few days. Boiled barley, a little treacle and bran, with a tablespoonful of nitrate of potash, should be given night and morning. Carrots and green food are of great service, while hay tea should be given to drink. These apparently simple cases are always to be regarded as dangerous, for, if neglected, or should the horse get another chill, they may end rather suddenly in congestion of the lungs, followed by death. Again, neglected cases may run on into

Nasal Gleet, a chronic mattery discharge from one or both nostrils. Now, the discharges from the nostrils are from so many different causes, such as chronic inflammation of the lining membrane, abscesses in the sinuses, diseased teeth, abscesses in, and affections of, the pharynx, larynx, and the lungs, also from that formidable disease called glanders—it is of the greatest importance that, in cases of these discharges, a professional man be consulted at once, to determine the nature of the complaint, and to treat accordingly.

In cases of abscesses in the sinuses, or of a diseased molar tooth, the parts have to be opened out—for which purpose a tubular saw,

termed a *trephine*, is employed—and the tooth removed, or the abscess dressed, as the case may be.

Glanders.—This is a very dangerous, contagious and inoculative disease, due to the presence of a micro-organism called the *bacillus mallei*. In the old coaching days, when stables were badly constructed, with low ceilings, and insufficient ventilation, glanders was very rife, and though it is now seldom seen in the country, it is, I am sorry to say, even more prevalent in towns than formerly.

It is found in the acute, sub-acute, and chronic forms. A horse suffering from chronic glanders may go on working and feeding for months before anything particular is noticed about it; except that its coat will look ragged and unhealthy, and the lining membrane of the nostril will have a peculiar leaden hue. The animal may have a slight discharge from one nostril, particularly the *left*, and a small enlargement under the jaw.

The case should be reported immediately it is suspected, as glanders is very dangerous to both man and beast, and inoculation, from the chronic, will cause the acute form, and death in a very short time.

At first the nasal discharge in glanders resembles healthy pus, of a yellow colour, and has a tendency to stick round the nostrils, but there is no foetid smell accompanying it. As the case proceeds, the discharge is occasionally streaked with blood. On examining the nostril, the *septum nasi*, or division, will be found to be ulcerated, the ulcers having a very peculiar appearance, which needs the eye of the expert practitioner to detect, and, as a rule, these when once formed, rarely heal up. The lungs of a glandered horse, on *post-mortem*, are found to be studded all over with small *nodules*, or tumours.

Farcy is allied to glanders, and may be considered under the same head. It may be acute or chronic. In the former, one (or more) of the limbs swells, with a great amount of constitutional disturbance, accompanied by a rise of temperature. The absorbent vessels, or lymphatics, become distended, like cords, and small buds (farcy buds) form at the valves of the vessels, generally bursting, and discharging a thin purulent fluid. Glanders and farcy are under the

Contagious Diseases (Animals) Act, and, being of a very dangerous nature, should be reported immediately on being noticed, and the animal destroyed at once. Thorough disinfection of the stable is of the greatest importance, to prevent the spread of the disease.

In doubtful cases a preparation called **Mallein** is injected under the skin on one side of the neck. If the animal is affected, a painful swelling arises at the seat of the injection, with constitutional disturbances, and a rise of temperature of three to five degrees. If glanders is not present, no re-action takes place.

Cough may be acute or chronic, and may arise from a variety of causes, such as sore throat, bronchitis, inflammation of the lungs, worms or parasites in the wind-pipe, diseases of the heart, &c., or foreign bodies in the throat or stomach; and also through reflex action from parasites in the stomach or liver. Now, as all these have distinct and peculiar sounds, it is therefore of the greatest importance to find out the cause before any proper treatment can be recommended, or adopted. Neglected simple catarrh may cause a slight cough from irritation of the lining of the throat, in which case stimulating embrocation, applied round the throat from ear to ear, may give some relief.

Laryngitis, or Inflammation of the Larynx, commonly called sore throat, may result from an injury, neglected catarrh, or a chill, from being exposed to draughts when the animal is heated, &c. Horses brought across the water from other countries are frequently affected with this on landing. It may, or may not, be accompanied by any constitutional disturbance. When simple, an application of mild, stimulating liniment, or mustard, round the throat, with soft food and good nursing, as recommended for catarrh, will generally set the matter right in a few days; but if the attack be acute, it may prove very dangerous, and end in the horse becoming a roarer. At the commencement the animal is dull and weary, hanging first on one leg, and then on another, nose poked out, coat on end, temperature elevated, mouth hot and frothing round the lips, eyelids partly closed, visible mucous membranes congested, breathing quickened, accompanied by a noise as the air passes over the inflamed surface, with sore, frightened cough; pain is evinced when the throat is

pressed, and there seems great difficulty in swallowing even small quantities of water, or other fluid, a portion of these coming back through the nose in the act of drinking.

Immediately the animal is noticed to be thus affected, it should be put into a good, roomy loose box, the body well clothed, the legs bandaged, and a mild cantharides liniment applied to the throat. I have, for years, tried all kinds of methods of applying a poultice, but never could fix one to my satisfaction. Its weight distresses the animal, and there is great difficulty in getting it to keep close enough to the throat. The best plan, then, is to apply a smart stimulant.

In all throat affections, it is dangerous to give draughts; yet, if 10 to 15 ounces linseed oil, with 1 to 1½ ounces spirits of nitre can be administered at the start, good effects may ensue.

Steaming the nostrils, by putting a dessertspoonful of carbolic acid, turpentine, or eucalyptus oil on a sop of hay in the bottom of a bucket, pouring boiling water on it, and holding the animal's head over the bucket for twenty minutes, four or five times a day, has an excellent and soothing effect, washing the nostrils at the same time with "sanitas" and warm water. The inhalation and washing are highly recommended in catarrh and bronchitis.

NOTE.—For this purpose, never put the head into a nose-bag.

Nitrate, or chlorate of potash, in 2 to 3 drachm doses, given in bran mashes, or in cold water night and morning; with linseed jelly and milk, or hay tea to drink, can be well recommended. Should the case assume a serious aspect, by the internal parts becoming congested and swollen, and the animal make a roaring noise, with danger of suffocation, tracheotomy must be performed. This is done by cutting into the windpipe, and inserting a tube through which the animal can breathe, independently of the nostrils. The operation is easily performed, and should not be delayed too long, as, when the horse is much oppressed in getting breath, some of the fluid, which it attempts to drink, may pass down into the lungs and produce congestion, while, when the tube is in, any fluid which may trickle down the windpipe comes out at the tube. I have frequently seen this. In all cases of throat affections, strange as it may seem, the horse is much fonder of dry, than of soft food or fluids.

Strangles, technically called *febra pyogenica*, is a febrile suppurative disease, most commonly seen in young horses, particularly at from two to three years old. It may be of a simple or complicated nature; in the latter case it is termed irregular, or bastard strangles. The name strangles, no doubt, originates from the strangling or choking sensation, which must be caused by the abscesses formed under the jaw, and beneath the ears. It is mostly seen during the spring months, or when young horses are newly brought in from grass, and in the midst of their dentition. The simple form may pass off very mildly, without much disturbance, the small abscesses coming to a head, and bursting, with no bad results following. Good nursing and ventilation are most essential in every case. Soft mashes, green food, carrots, or potatoes, may be given with great advantage. If necessary, a small dose of linseed oil—10 to 15 ounces—may be administered, and nitrate water given to drink.

When the abscesses develop in an irregular manner, some forming under the jaw, and others under the ears, or on the side of the face, bursting and forming again, the case requires skilled attention, as it may result in the complicated form, or bastard strangles, ending in **pyæmia**, in which condition abscesses are formed in various parts of the body; the horse becomes feverish, and pulse quick and small; it has no appetite; the coat stands on end; whilst in some cases, the legs swell, and the abscesses under the ears become so large that the animal is threatened with suffocation, when tracheotomy has to be performed. The bowels must be regulated with mashes, or green food. Purgatives must be avoided, but, if necessary, an ounce or two of sulphate of soda in a mash, or drinking water may be given daily; the throat should be well blistered, and the nose steamed (*see page 161*). Chlorate of potash, in two drachm doses, given in the drinking water, along with 20 drops doses of strong hydrochloric acid, twice a day, has a good effect.

Young colts should never be castrated when strangles is prevalent, as the operation may prove troublesome and annoying. Strangles frequently terminates in

Roaring, which is a peculiar noise made by the horse during the act of inspiration, when put to heavy or fast work. It can be produced by many things, but is very often traceable to a hereditary tendency. Injuries to the throat by foreign bodies, setting up irritation and inflammation of the pharynx and larynx; tight reining of carriage-horses, as with bearing-reins; severe colds, &c., are all liable to produce the disease, while long, peacock-necked horses are more prone to it than short-necked ones.

The complaint is mainly due to the muscles on the left side of the larynx becoming wasted away—*atrophied*—losing their bright red colour, and assuming yellow-like strings, so that they are unable to do their work of opening the cartilages during the act of breathing. Thus the left side remains stationary, and the vocal cord inside hangs loose and limp, so, on inspiration, more air rushes in than can be conveniently accommodated and let out; and if the breathing be in any way hurried from exercise, this air, forcing itself through the half-opened passage, produces the roaring noise.

The wasting of the muscles is considered to be due to loss of nerve power. The nerve supplying them is the *inferior laryngeal* branch of the **pneumogastric**. This nerve is divided into two branches—the right and left *recurrent laryngeals*. The latter passes down into the chest, winding round the aorta, just above the heart, then proceeds up the neck with the carotid artery to supply the muscles of the left side of the larynx. It has a much longer course than the right branch, and, hence, is more liable to derangement. Thus it is that the left side of the larynx is especially affected in roaring. Several operations have been tried for its cure, but, so far as they have gone as yet, in my opinion, nothing is better than tracheotomy: by this, a horse can be made serviceable for years, either for fast or slow work.

In examination for soundness, it is a matter of vast importance to carefully test the wind. In a strong horse particularly, it is usually the case to put the animal against the wall, and feign to strike it. If the subject be a roarer, it will, in the majority of cases, give a long groan; but if a sharp grunt be emitted, the probability is that the horse is only a grunter.

This is a very imperfect test; the best plan is either to gallop the horse some distance, or to make it pull a heavy load up hill. These trials will soon prove whether the animal is a roarer or not.

Whistlers and Highblowers are modified forms of roarers, generally due to similar causes, and should always be regarded with suspicion.

Bronchocele or Derbyshire Neck.—This is an enlargement of the thyroid glands, by no means common in domestic animals, but of frequent occurrence in human beings, especially those living in limestone districts. Iodine preparations have the best effect.

Bronchitis, or inflammation of the lining membrane of the bronchial tubes in the lungs, may either be acute or chronic, affecting one or both lungs; either the large, or small, branches of the bronchial tubes may be attacked separately, or in conjunction. It is a serious and anxious malady: for if, from the inflammatory process, some of the bronchial passages become blocked up, and the blood cannot get properly oxygenated, impure blood is sent through the system, which acts on the nerve centres, causing great debility very early on in the complaint. As a rule, the horse will not lie down in chest affections; in acute attacks of bronchitis it will, at an early stage, be found leaning against the stall for support. Again, on account of the impure blood circulating, oxydation of the tissues cannot go on, and coldness of the extremities and surface of the body is the result.

In health, there is a certain amount of moisture always present in the mucous lining, but, in the early stages of the complaint, on applying the ear to the windpipe, at the lower part of the neck, a dry crisp sound is heard in the bronchial tubes. However, as the case advances, this gives way to a loose slobbery noise, while the cough, which is at first dry, hard, and sore, becomes similarly changed to a soft and loosened one. Great care must be taken at this latter stage, as the inflammatory mucous material, on being thrown off, makes its way up the windpipe to be coughed up and discharged by the nose.

The causes of bronchitis are similar to those of ordinary colds, and are various, such as chills, removing from cold to hot stables, or

any sudden changes of temperature, east winds, smoke, parasites or foreign bodies in the tubes, &c. In the cow, during the early spring months, when east winds are prevalent, it is a very common accompaniment to retention of the second cleansing, where the flow of the debris—blood, &c.—from the womb has been checked, also by moving the animal too early after calving. (*See page 171*).

SYMPTOMS.—Generally speaking, all derangements and diseases, more especially of the respiratory organs, are ushered in by a shivering fit. If this be noticed, the animal should be well clothed up, and a good stimulant, such as $\frac{1}{2}$ pint whisky in water, or from 1 to 2 ozs. each of aromatic spirit of ammonia and spirits of nitre, administered in water. As a rule, however, the first symptom noticed is that the animal is very dull and languid, has a staring coat, the inside of the eyelids is red, the mouth hot, the head drooped, and the breathing more or less accelerated, with a soft, weak pulse, and an elevation of temperature.

The animal should be put into a good, dry, loose box, free from draughts, and the sides of its chest, behind the shoulders, stimulated with mustard and water, afterwards well clothed up, and legs bandaged, and given a little nitrate of potash in the drinking water.

It is very dangerous to use purgatives in these cases, as great debility soon sets in, and the aperient, however slight,—even 8 ozs. linseed oil—may set up superpurgation, which tends to remove the inflammation from the bronchial tubes to the lining membranes of the intestines, causing muco-enteritis and death. Or, perhaps, from the continued purging, the inflammation may again be shifted to the feet, producing laminitis or founder. This shows how very necessary it is to know what the chest affection really is, before attempting to treat it in any way. In all chest diseases there is great danger in giving draughts, as some of the fluid might get into the trachea or bronchial tubes, causing great distress, so that if a draught has to be administered, it must be done with great caution. Half-ounce doses of carbonate of ammonia in a ball, or in the drinking water, every eight hours may be given with advantage, or $\frac{1}{2}$ oz. doses of chloro-

dyne, with 1 oz. glycerine, given three times a day in mashies of bran or boiled barley, or in hay tea, nearly cold, will be found of great service.

Applying blankets, which have been wrung out of hot water, round the chest with dry rugs above them, and steaming the nose and air passages, as recommended for laryngitis—(page 161),—have a very good effect, and give much relief.

Food of an easily digestible nature must be given, such as boiled barley, milk and water, linseed jelly, carrots, potatoes, green food, *chopped whins* (*gorse*), &c., It is a good practice to feed patients (discharging from the nose) from buckets, or troughs, as near to the ground as possible, and so give an easy means of exit to the discharge.

Congestion of the Lungs.—This is a very common termination of many diseases, and is, in some cases, very easily produced. For example, when an animal is suffering from a slight cold, with relaxed system, a sudden chill will induce congestion of the lungs, and kill the animal in a few hours. On account of running its course so rapidly, in many cases, there is little time to combat with the complaint. It is often, in fact, worse to handle than *inflammation of the lungs*. The difference between congestion and inflammation is, that in the former, the blood sinks into the tissues of the lungs like water into a sponge, but there is no visible structural change of the part; for want of tone, the blood accumulates, giving the lungs a deep brownish-black appearance. Yet, when they are put into water, they do not sink to the bottom, but, being loaded with blood, sink just below the surface—water-logged, as it were. Inflammation, on the other hand, changes the structures. The lungs become solid, similar to liver, and, when put into water, sink to the bottom like lead, the air-cells being completely blocked up by inflammatory products; whereas, in congestion, they were merely pressed on by the congested vessels.

Congestion is, at times, readily induced, especially in a badly-conditioned horse, by a heavy, fast run with hounds, the animal being galloped to a standstill. The rider having dismounted, the girths should be slackened, and the horse's head turned to the wind;

then, after it has settled down a little, the contents of the horseman's flask—if *he has one*—should be given, with an equal quantity of water ; the patient should then be carefully led to the nearest box or stable.

In acute congestion, if early on the scene, I know of no better or quicker relief than taking three or four quarts of blood from the jugular vein ; this takes off the pressure, allows freedom to the right side of the heart, and gives the *functional* vessels a little liberty to relieve themselves. Follow this up with stimulants, and a good case will generally be the result. The after-treatment should be much the same as recommended under “Bronchitis.”

Any of the foregoing complaints may end in inflammation of the lungs, or

Pneumonia.—In this, the substance of the lung undergoes inflammatory action, and structural change ; the air-cells become blocked up and consolidation of the lungs takes place.

Pneumonia, arising as it does from a variety of causes, and passing through many stages, requires different treatment.

If a proper diagnosis can be arrived at, and it is certain that the disease really is true pneumonia, then more heroic treatment may be adopted than that used for bronchitis. At the early part of the attack, when the animal's breathing is hurried, the nostrils dilated, the eyelids red, and the pulse full and oppressed, extracting five or six quarts of blood has a wonderfully good effect ; this may be accompanied by a dose of from 15 to 25 ounces linseed oil, with 1 to 2 ounces spirits of nitre, and 10 to 15 drops tincture of aconite (Fleming's). Hot water blankets should be applied to the chest, nitrate of potass given in drinking water, with soft food, as recommended for bronchitis—good nursing always being highly essential.

Associated with this disease, we may have **pleuro-pneumonia**, in which both lungs and pleura are involved, as in cattle ; this, however, is not contagious.

Pleurisy consists of inflammation of the pleura ; that is, the serous membrane which lines the chest and covers the lungs. This is a very painful complaint ; the animal stands still, seeming frightened

to move, the elbows are turned out, and ribs as stationary as possible. The breathing, which is very hurried, is for the most part carried out by the abdominal muscles, thus causing a ridge or line—the pleuritic line—from the elbow point to the haunch-bone. If made to move, the animal groans with pain; the eyelids are red, nose poked out, and the pulse is full and strong. At times, a painful *frightened* cough is emitted. When both surfaces of the pleura are involved in the inflammatory action, bands of fibrin are formed between the lungs and the walls of the chest. This formation will take place in the space of from thirty to forty hours, while the chest becomes full of water, on one or both sides. At first, treatment similar to that mentioned under inflammation of the lungs should be adopted.

Bronchitis, Pneumonia, Heart Disease, and Pleurisy—particularly the last—may terminate in **Hydro Thorax**, or water in the chest, in which, on breathing, the water can readily be heard by a practical ear. The legs swell, and the animal is oppressed. It must be relieved by tapping the chest just behind the elbow, following up with iodine and iron tonics, combined with suitable diuretics, good food, and fresh air.

In all acute cases of chest affections, on account of the horse's breast-bone being set vertically, the animal will not lie down for fear of suffocation, but, as the case progresses, lying down is a good sign of convalescence. The cow, on the other hand, having a flat sternum, or breast-bone, and joints at the lower end of the ribs as well, can lie throughout the whole attack.

Asthma, or Broken Wind.—This is by no means so common as it used to be. It may be said to exist in two forms. The first of these consists of spasms, or rigid contraction of the bronchial muscles, induced by the inhalation of certain matters, such as new made hay (producing hay asthma or hay fever). This is oftener seen in the cow than in the horse, more particularly after haytime, when the animal is put on to the fog, or after-math. There is great difficulty in the breathing, which is of a tight spasmodic nature, accompanied by a wheezing, squeaking sound, eyes staring, and nostrils distended. The animal will take no food while the attack is

present, which may last from four to twenty-four hours. Put the animal into a roomy loose box, or, better still, out in the fresh air, and give such remedies as camphor, digitalis, chloral hydrate, belladonna, or *inhalation of the fumes of eucalyptus, or terebene*.

The second form is of more importance, and is due to structural change in the lungs; some of the small air cells become ruptured, the air finding its way through the tissue to beneath the pleura, giving the surface of the lung a blubbery appearance, called **emphysema**.

This form of the malady is, in a great measure, in my opinion, caused by bad food—more particularly musty hay, and bad corn—also by putting the animal to too hard an exertion, as starting off full trot immediately after feeding. These act not only mechanically, but also on the gastric branches of the pneumo-gastric nerve, which, by reflex action, implicate the lung or chest branches.

As this form of complaint is incurable, the great point is to get the animal to work comfortably, and for this purpose the feeding must be regulated; nutritious diet of not too bulky a character ought to be given, and plenty of fresh air allowed. A case of this kind does best out of doors. The affected animal always has a peculiar way of breathing. The inspiration is performed with comparative ease, but the expiratory effort is double, the flank falling with a jerky motion. The cough is also noticeable, being a long, dry, droning bark, and is characteristic of the disease.

On applying the ear to the lower part of the windpipe, a crackling, hissing sound is heard in the lungs.

Formerly, low dealers used to practise all sorts of tricks in selling an animal thus affected—such as pouring one or two pounds of lead shot, with a pound of melted butter, down the horse's throat. This weighed the stomach down, taking the pressure off the diaphragm, and thus allowed the lungs more play, when the horse breathed almost naturally. Another practice was to cut a hole into the abdominal cavity, close to the rectum, when the air being allowed access, rushed in, and had the effect of assisting the

breathing. I have seen a few of these cases in the early part of my professional career.

Influenza.—This is a very extensive malady, and may appear in a very simple or seriously complicated epizootic form. It sometimes attacks the limbs, and the muscles of the body, at others the respiratory, and the digestive organs, the heart and its covering being generally affected. The disease occasionally assumes a typhoid character. It is ushered in by shivering fits, with a staring coat, followed by fever, great languor, and swelling of the legs, &c., while in some cases, the eyelids are swollen, and take on the nature of what is called **Pink-eye**. It is very dangerous to tinker with this disease, and purgatives are greatly condemned, the mode of treatment laid down under “Bronchitis” (*page 165*), may be adopted, on the appearance of the complaint, following up with stimulants, such as ammonia, brandy, acetate of ammonia, chlorate of potass, or quinine and iron tonics; small doses of salts may be given, if required, to regulate the bowels.

Seeing that all cases of affections of the respiratory organs are somewhat analogous at the commencement, they should be placed under the care of a professional expert without delay, and not tampered with by giving quack medicines.

Distemper in the Dog is somewhat analogous to influenza in the horse—attacking sometimes one, and sometimes another part, of the body. Some breeds of dogs suffer more from the malady than others. Good nursing and warm bedding are indispensable. The bowels should be regulated by small doses of syrup of buckthorn, or castor oil, following up with hyposulphite of soda and quinine.

Beef tea and port wine, iron tonics, or Easton’s syrup, may be given with great advantage.



CATTLE.

The chest affections of the cow are not of such common occurrence as those of the horse. Colds, chills, changes of temperature, east winds, &c., as a rule, affect the digestive organs more than those of the respiratory system. Still, we now and again come across cases of acute catarrh in the cow, where the animal shows great depression, with excessive watery discharges from eyes and nose, associated with diarrhœa.

As the case proceeds, the eyes become red and gummy, and secretion crusts round the nostrils; the animal will scarcely get up, lying constantly, the case assuming a typhoid character.

Good nursing is eminently necessary; clothe the body well, and make the patient as comfortable as possible: give linseed jelly and milk to drink, warm ale and gruel, with aromatics, ginger, aniseeds, &c., and administer 3 to 4 drachm doses of chlorate of potass, with 25 drops of strong hydrochloric acid, in cold water, twice a day, with occasional half-pint doses of linseed oil. Steaming, and washing the nostrils, as recommended on page 161, are also of great service.

(1) **Bronchitis**, (2) **Congestion of the Lungs**, (3) **Pneumonia**, and (4) **Pleurisy**, arise in the cow from somewhat similar causes as in the horse, and, again, require somewhat similar treatment.

Bronchitis and Pneumonia, I frequently meet with in the cow, following parturition, more particularly in the early spring months. These have a septic tendency.

The **Bronchitis** (*parturient bronchitis*) is usually of a sub-acute nature, the animal drops off its food and cud, secretion of milk is nearly suspended, the flesh falls off very quickly, and the animal has a languid appearance, and a painful, sore cough, yet the breathing is not much disturbed; while the **pneumonia** is of a more acute character, the symptoms are somewhat similar, only the cough is not so frequent or so painful, and, on applying the ear to the side of the

chest, the lungs are heard to have a peculiar, jerky, squeaky sound, the breathing is also much quicker, and abdominal. The following treatment answers well in both cases:—Put the animal into a good loose box, and give 5 ounce doses of linseed oil, once a day, following up with half a-drachm (B.P.) carbolic acid, and $\frac{1}{2}$ ounce glycerine, every ten hours, in milk or water, with good nursing, tempting the appetite with anything that the animal will eat.

The most formidable of all chest affections in the cow, which we have to deal with, is

Pleuro-Pneumonia, or combined inflammation of the lungs and pleura.

We have two kinds—the *simple* and the *contagious*.

On account of the structural arrangements of the lungs of the cow, I have seen *post-mortem* appearances, resembling those of pleuro-pneumonia (contagious), exhibited in the lungs, where I have traced a needle, or wire, in its course from the stomach, through these organs to the heart; and I have had numbers of cases—single, solitary cases—of simple pleuro-pneumonia, which showed all the marbled *post-mortem* appearances of contagious pleuro-pneumonia, but of a paler pink hue.

Simple Pleuro-Pneumonia.—The symptoms are analogous to those of the contagious, but of a more acute nature, and the cases are *solitary*, *i.e.*, there is not a general outbreak of the malady.

The treatment recommended is Fleming's tincture aconite, 10 drops, and potass-nitrate, 3 drachms, every eight hours, in water, and $\frac{1}{2}$ pint linseed oil every night.

The **contagious pleuro-pneumonia** is a specific inflammation of the lungs, somewhat resembling, in my opinion, specific erysipelas in the human subject. It may be acute, sub-acute, or chronic, and part of one, or, perhaps, of both lungs may be affected.

In some cases, the animal shows no symptoms of illness—feeding, chewing the cud, and milking; and the great rise of temperature may be the first thing to attract attention to the chest, where the sounds peculiar to this disease are heard. Primarily, there are crepitating murmurs; next, a squeaking, jerky friction,

or rubbing sound; finally, the lung solidifies, and no sound is to be heard over that area. On striking, or tapping, the chest, over this part, there is a dull, solid response.

In an acute case, the animal drops off its feed, cud, and milk; stands stiff and thoughtful, with nose poked out, and drooping; sides dropped in, and flat; breathing fast, and entirely done by the abdominal muscles: there is a short, dry characteristic cough, and the temperature generally ranges from 104° to 106° . Auscultation, or listening to the sounds in the chest, with the history of the case, assists in arriving at a diagnosis. As the disease is now being stamped out under the Contagious Diseases (Animals) Act, no treatment is allowed. Inoculation is carried on in some countries, with great success. I have seen it tried, with the best results.

Associated with chest affections of the cow, we have that formidable disease—

Tuberculosis, Consumption, or Scrofula, which is prone to attack all the parts of the body—bones, glands, brain, intestines, and lungs. The last-named, however, seem to be afflicted with the largest share of its attentions. Tuberculosis attacking the lungs of the cow, may be acute or chronic. In the former the lungs, and inside of the walls of the chest, are studded all over with small tubercular nodules grouped together or continuous. The animal may possibly have been doing well up to the time it was noticed to be severely ill—in fact it may be quite fat. These cases, on their commencement, exhibit all the symptoms of pleuro-pneumonia, and it may only be in *post-mortem* examination that the true state of affairs is found.

In an acute case the only difference I have found between it and pleuro-pneumonia has been (1) the history of the case, and (2) the absence of the dead sound on striking or tapping the walls of the chest.

In a chronic case an animal may go on feeding, thriving, and doing well, and nothing may be observed until slaughtered, when masses of tubercular matter are found studded throughout the lung substance, some in a fluid condition, others semi-fluid or solid, enclosed in a capsule. An animal affected like this, I think, might be used for human food; but when it shews the symptoms during life,

by falling off in flesh though feeding and milking, with a bad cough, hidebound, with a yellow scruffy skin, with all the symptoms of a "piner," the sooner it is either buried or cremated the better.

Tuberculosis is, by microscopic experts, considered to be due to the *tubercular bacilli*, and infectious both by inhalation and ingestion. It may be so where animals have a hereditary tendency to it, cohabited with others thoroughly diseased. Looking backwards for a number of years, I can call to mind one particular bull, whose stock—sons, grandsons, and great-grandsons, &c., for ten generations—introduced the disease amongst herds where formerly it was never known. Even up to the present day I can put my finger on some of this bull's diseased descendants, and, strange to say, the malady rarely shews its appearance until the animals are coming two years old. The same seems to hold good in the human subject. When there are two families, one mother, but two different fathers, one strong and healthy, the other consumptive, the children by the consumptive father are stricken by the fell disease usually on their reaching the age of puberty, while the family by the healthy father are hearty and well, without the least symptoms of the malady—yet all living together, and feeding at the same table. Again, calves, newly-born, have been found to be tubercular. Where did they get the disease from? With these facts before me, I am inclined to think that it is more spread by hereditary principles than by either inhalation or ingestion, and, even then, more by the male, he having fifty times more opportunities than the female.

Seeing that the disease is so very rife—particularly in well-bred animals, as well as in dairy cows; in fact, the extent to which it is found in the latter is very appalling, and when microscopic experts and doctors tell us that the malady is caused very largely in children by drinking milk from tubercular cows, it is a great wonder that tuberculosis is not scheduled under the Contagious Diseases (Animals) Act. The Government should have a special form for dealing with such cattle, destroying them, and compensating the farmer, butcher, or other financially interested parties. If the disease is so frightfully spread by the milk, Government should also have all

dairy cattle subjected to the action of the **Tuberculin** test, and those cattle showing a rise of temperature separated from the others, and either fed off, or destroyed, and compensation given. If this were done, the country would be astounded to hear of the extent of the disease amongst our milk and butter producers.

I have tried the tuberculin test in three cases—one healthy, and two diseased subjects, the latter answering well to the test. Of late, I have had my attention drawn to a large number of rabbits, badly affected with tuberculosis.

Hoose, or Husk, in Calves.—This consists of irritation of the trachea and bronchial tubes, caused by small, white thread-like worms (*strongylus filaria*) gaining access to the windpipe. It is not nearly so common as it was some years ago. The great cause is putting young calves out to grass at the back-end of the year—August and September—on strong wet soils, and leaving them there after sun-down. The symptoms are first noticed in September and October, when the animal is heard to have a sharp, tickling, husky cough; flesh falls off fast, and the calf soon shows a starved appearance; the cough increases in frequency, and finally becomes very troublesome, accompanied by occasional diarrhœa. Although the animal may still take its milk, it does not thrive, and finally dies—worn out—from exhaustion, the *post-mortem* revealing large numbers of worms in the windpipe.

Treatment is not at all times satisfactory. Turpentine, in dessert-spoonful doses, in a teacupful of linseed oil and milk, given every third day, answers as well as anything, at the same time keeping the system up as far as possible, giving linseed jelly or well-boiled gruel, of equal parts of oat and barley meals, and milk, with crushed oats, cake, bran, and a little *salt*, and having good warm boxes, and clean dry beds.

Fumigation, with chlorine or sulphur fumes, is sometimes resorted to, but I think iodine fumes are more beneficial. For the purpose of fumigation, a small portion of iodine should be placed on a hot brick, and this having been put into a bag, the calf's head should be held in the bag for a few moments. This destroys the

worms, but the parasites have to be coughed up afterwards, so that good nursing is still required. In some parts of the country inter-tracheal injections of turpentine are resorted to with great success. But the best thing is not to have the complaint at all; and where the system of keeping the calves indoors, giving them cake, corn, bran, and a little *salt*, until they are twelve months old, is carried out, it is rarely heard of. Dressing the disease-producing grazing lands with 10 cwts. crushed rock salt to the acre has a magical effect in preventing the complaint.

Bronchitis.—Young calves, during the winter and early spring months, often suffer from acute bronchitis, with congestion of the lungs. The complaint is most frequently found in badly-ventilated boxes, or “hulls,” with low-lying floors, wet soppy beds, and bad drainage. The symptoms, which much resemble hoose, are more acute, and accompanied by diarrhœa, but no worms are found in the air-passages. The lining membrane of the bronchial tubes is thickened, and the lungs more or less congested.

When first observed, the calves must be removed to better and more comfortable quarters, and a little mustard and water rubbed well into the sides, behind the shoulders, and 2 to 3 drachms each of acetate of ammonia, spirits of nitre, and syrup of squills, given three times a day.

If the cough is troublesome, a teaspoonful of chlorodyne may be added. Food the same as recommended for hoose.



- 3.—The **pons varolii**, or bridge, connecting the right and left portion of the cerebellum.
- 4.—The **medulla oblongata**, or connecting link between the spinal-cord and the brain proper.

The **Brain** is covered by three coats or membranes, called the **Meninges**. These are (1) *Dura Mater*,—a tough, fibrous membrane, lying in immediate contact with the bony skull; (2) the *Arachnoid* membrane (spider-web), or middle coat,—a very fine, delicate, serous membrane; (3) the *Pia Mater*, which covers the surface of the brain,—a very fine, extensive membrane, made up of a net-work of small blood-vessels; this coat follows and covers all the convolutions of the brain, and supplies it with blood.

The **Cerebrum**, or large brain, is divided by a fissure, into two hemispheres, each of which is mapped out into numerous convolutions of grey matter, covering white fibrous nerve-material. The cerebrum is said to be the main seat of sensation, reason, and will.

The **Cerebellum**, or small brain, has also two hemispheres, made up of convolutions, but much smaller than those of the cerebrum, and differently arranged. The grey nerve substance is most abundant, and external to the white nerve tissue. The cerebellum is thought to control and regulate the muscular action of the body.

The **Medulla Oblongata**—the connective medium between the brain and the spinal cord—consists of white and grey nerve matter, but differs from the brain in having the grey matter internally. Its functions are of vast importance to life, as it regulates and controls the actions of breathing, swallowing, &c., &c.

The **Spinal Cord** is a long, irregular, cylindrical mass of nerve matter, running through the vertebral column. It is composed of white matter externally, the centre being grey, and, like the brain, it is covered with three similar membranes; as it passes down the vertebral canal, nerves are given off in pairs, on both sides, passing out between each vertebral section. The *upper root* of these pairs is *sensory*, conveying sensation from the part of the body to which it is distributed to the **excito-motor centre** in the spinal

cord, thence to the brain. The *lower root* is that of motion, conveying motor-power from the brain, through the medium of the excito-centre, to the muscles, &c., supplied by it, these being more or less under the control of the will.

The **Excito-motor Centre** in the spinal-cord can, however, act independently of the influence of the brain—as witnessed by the movement of the leg of a frog, on irritating the web of the foot, a few hours after the head has been cut off; so, if any part of the extremities is injured, say by a prick of a nail, or a burn, the sensation of the pain thus caused is passed along the sensory nerve fibre to the cells in the excito-nerve centre, which, in turn, induces the motor nerve fibre to exert its action, and by the aid of the muscles it supplies, the limb is instantly withdrawn from the point of danger.

The **Cranial Nerves**, or nerves given off from the brain direct, are 12 pairs:—

1st pair.—Olfactory, go to the nose; special sense of smell.

2nd pair.—Optic, go to the eye; special sense of sight.

3rd pair.—Motores Oculorum, supply the muscles of the eyeballs (two exceptions) with motor power.

4th pair.—Pathetic, supply one muscle of each eyeball with motor power.

5th pair.—Trifacial, mixed sensory and motor nerves; supply the different parts of the face, tongue, &c.

6th pair.—Abducens, supply one muscle of each eyeball with motion.

7th pair.—Facial, the great motor nerves of the face.

8th pair.—Auditory, go to the ear; special sense of hearing.

9th pair.—Glosso-Pharyngeal, mixed sensory and motor to the tongue, pharynx, &c.

10th pair.—Pneumo-gastric or Par-vagum, mixed nerves; supply stomach, lungs, pharynx, larynx, trachea, &c., (very important nerves).

11th pair.—Spinal accessory, motor nerves.

12th pair.—Hypo-glossal, supply tongue, &c.; motor nerves.

Although the brain is the seat of emotion, reason, and sensation, it is of itself non-sensitive, as different portions may be cut away with little or no effect. I remember a case where a groom was thrown from a horse, and kicked on the side of the head, just above the left ear; the skull was driven in, and a portion of the brain protruded $1\frac{1}{2}$ inches, which could be handled with the fingers without causing the patient any uneasiness, yet, if his lips were touched, the body was thrown into frightful contortions; he was semi-conscious. The protruding portion was left alone, when it gradually receded, and within a week had all returned to its proper place, a splendid recovery being made.



PLATE XXX. (WARD).

FIG. A.—BRAIN OF HORSE—UPPER SURFACE.

1. 1. Cerebrum—Right and Left Hemispheres.
2. Cerebellum.
3. Medulla Oblongata.

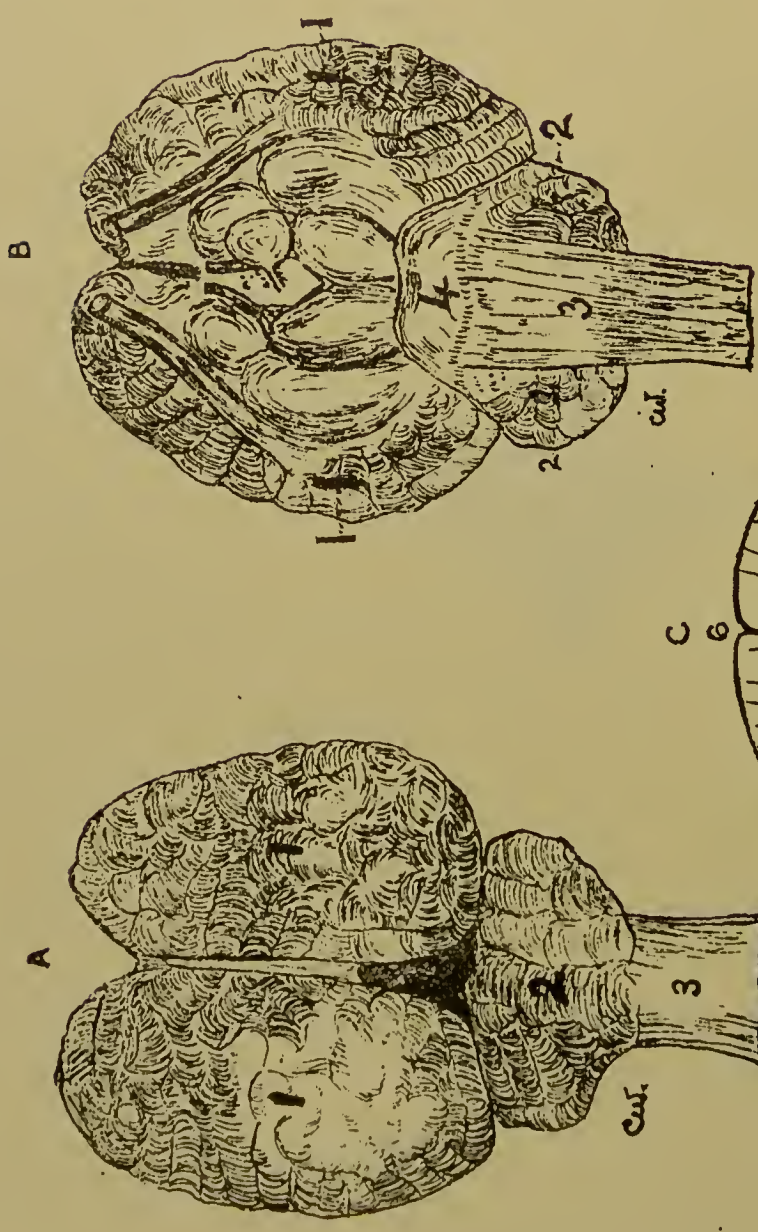
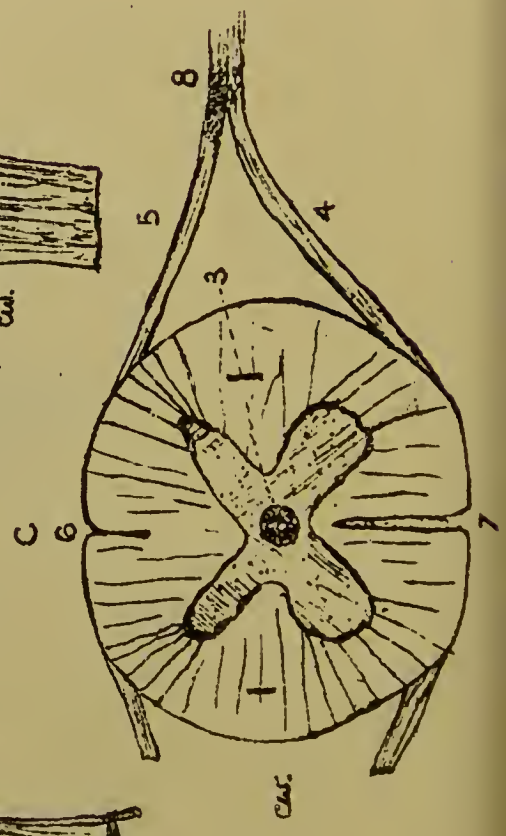


FIG. B.—BRAIN OF HORSE—UNDER SURFACE (BASE)

1. 1. Cerebrum—Right and Left Hemispheres.
2. 2. Cerebellum.
3. Medulla Oblongata.
4. Pons Varolii.

FIG. C.—TRANSVERSE SECTION OF SPINAL CORD.

1. 1. White Matter.
2. 2. Grey Nerve Matter.
3. Central Canal.
4. Motor Nerve.
5. Sensory Nerve.
6. Superior Surface.
7. Inferior Surface.
8. Junction of Sensory and Motor Nerves.



DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

The **Functional Derangement** and **Diseases** of the brain and nervous system are not of so frequent occurrence in the domestic animals as they are in the human subject, yet, from their peculiarity and obscurity, they are most interesting, arising as they do from a great variety of causes. *Functional disturbance* is, in many cases, due to *reflex action* ; the real cause being very remote from the brain, as, for instance, derangement or disease of any portion of the digestive organs, as stomach-staggers in horse and cow (*see pages 76 and 93*), worms in the stomach and intestines ; or affections of the urinary and generative systems, such as hysteria, epileptic fits, puerperal eclampsia and parturient apoplexy, biliary and uremic poisoning, also mineral (lead) and vegetable poisoning.

Before suitable treatment can be adopted, it is of the utmost importance to find the cause ; failing this, the acute and most prominent symptoms must have immediate attention, and be relieved so far as possible.

Hysteria, although very rare, is sometimes met with both in the mare and in the cow, more frequently in the latter. It seizes the animal very suddenly ; more particularly is this so when coming into service for the first time.

In the mare, the head is pulled upwards and backwards ; the eyes are very watchful ; the nostrils are dilated, and on touching, or even approaching the patient, it becomes very excited ; it may kick and struggle, or rear up, and fall over backwards.

In the heifer, the symptoms are somewhat similar to those in the mare ; it is, however, more subject to convulsions, and falls down

suddenly, bellows loudly, champs and foams at the mouth, and grinds the teeth. The eyes roll about, and there are strong muscular tremblings, and contortions of the limbs and neck, as if the patient were in a fit.

TREATMENT.—Bleeding, to the extent of five or six quarts, is very useful, followed up by dashing cold water over the head; and after the paroxysm has passed, chloral hydrate and bromide of potass., $\frac{1}{2}$ oz. each, in a pint of cold milk, should be administered. One to two drachms of the extract of belladonna may be substituted for the chloral and bromide. From 20 to 30 ounces of linseed or castor oils should also be given, and it may be found necessary to repeat the bromide every eight hours. As a rule, the symptoms disappear in a few hours.

Epilepsy. (Fits). This peculiar nervous derangement may arise from a number of causes, such as retarded dentition; worms in the stomach and bowels; improper food, causing intestinal disorder; and uterine complications. The attack is generally very sudden; the animal stops instantly, trembles all over, and falls to the ground, the whole muscular system being thrown into violent contortions. There is rocking and working of the head and limbs, and rolling of the eyeball, which turns in under the upper eyelid. The teeth are firmly held together, and a frothy discharge comes from the mouth. The heart beats fast and loud, while the breathing is suspended for a few moments; and dung and urine are involuntarily ejected. After the convulsive attack has passed, the patient frequently falls into a long deep sleep, from which it awakes, showing little or no ill effects, with the exception of a slight languor and listlessness.

The pig and the dog are the greatest sufferers from this affliction. Young pigs are very often attacked, especially if fed too largely upon badly prepared maize meal; this stuff should always be *well-boiled*, and even then, used very sparingly amongst young pigs under two months old. Feeding on pollards or parings, answers much better, and is certainly safer.

In the dog, retarded teething, and tape worms in the alimentary canal, are responsible for most cases of epilepsy.

TREATMENT.—When the patient is seized, every care should be taken to keep it from injuring itself, and a free access of air should be allowed in all cases. Benefit will be derived from a continual cold-water *douche* on the head. If the teeth are firmly clinched together, a piece of wood or some other suitable substance must be pressed in between them, to prevent the tongue being injured.

After the attack has passed over, a careful examination ought to be made, to discover the cause. If the teeth are at fault, the offending ones, or shells must be removed, and, if necessary, the gums scarified; but, if worms are suspected, a dose of worm medicine, followed by a purgative, should be given. As a nerve sedative, either the bromide of soda or potass. may be administered with advantage.

Puerperal Eclampsia.—Several cases of this peculiar epileptic form of nervous excitement in cows, that have been calved from 12 hours up to 10 days, have come under my own observation. At first, the cow is noticed to be very excitable, paddling with the hind feet, switching the tail, pointing out the nose, and holding the head upwards and backwards; the eyes are wild and staring, and the milk secretion is partially suspended; in fact, the animal shows all the early symptoms of an attack of milk fever. But by far the most prominent symptom is the extreme sensitiveness of the skin, for the moment you touch, or even attempt to touch its body, the cow will give a loud bellow, open the mouth wide, stick out the tongue, and attempt to jump to one side and kick out. The breathing is very quick, and the pulse is full and strong.

TREATMENT.—Bleeding to the extent of from 4 to 6 quarts, followed with from 4 to 8 drachm doses of chloral hydrate in a pint of cold milk. This medicine can be repeated, 4 or 5 hours afterwards, if required. In the meantime, however, the following should be administered as a purgative, viz.:—2 lb. castor oil, 2 lb. treacle, and 2 quarts of thin gruel. As a rule, this mode of treatment, along with spare feeding on nice digestible food, is very successful.

Sunstroke (*see Stomach Staggers, page 76*).

Louping-ill, Trotter-ill, Trembling, or Sheep Staggers.—This malady is more common to sheep, than any other animal; cows, however, are sometimes affected. It is mostly seen in Scotland and the North of England, more particularly in Northumberland. It most frequently appears in the spring, about the middle of April, and in certain places again in October, seeming to be greatly favoured by cold, droppy weather.

For years, great loss has been sustained by its ravages, and numerous investigations have been carried on for the discovery of the cause. Still there is a great difference of opinion on this point.

The farmers and shepherds, living on the disease-producing farms, say, that wherever the rough, coarse, white grasses, principally the dead and decaying foliage of the previous year's growth of sweet-scented vernal (*anthoxanthum odoratum*), known as "tath," is in abundance, the complaint is rife, and they have an idea that this grass has something to do with the malady.

PRINCIPAL WILLIAMS, of the NEW VETERINARY COLLEGE, EDINBURGH, from investigations carried on by him for some considerable time, is of opinion that the malady is due to a microbe, and that the tick (*ixodes*) plays a very important part, in acting as host for some of the transformations of the germ.

Dr. Klein, in 1893, investigated the matter for His Grace the Duke of Northumberland, K.G., and reported—"The disease has a seasonal and local epidemic character," and that "the malady strongly pointed as belonging to the class of infectious diseases, and was, apparently, communicated from one animal to another;" yet, he says:—"The *causa causans* of the disease is contained on, or in the soil;" also "When the disease prevails, a fence between one sheep farm and the next, was occasionally found to be the boundary between the infected and non-infected area."

Now, if the soil be the cause of the first case, why should it not be the cause in all the succeeding cases that are susceptible to its influence, seeing that as many as from seven to ten sheep will die in 24 hours? My view is, that it is allied to enzootic diseases, and like red

water in cattle, common to certain localities and soils, from the same common cause. I think it is due to the indigestible and innutritious nature of the decaying grasses, producing derangement of the digestive organs, and deterioration of the blood, which in turn, act on the nerve centres, inducing a want of co-ordination of movement; hence, trembling and imperfect action of the limbs. Or, the complaint may be from reflex nervous action, arising from the irritating effects of the innutritious herbage on the stomach, producing the peculiar

SYMPTOMS.—The first to be noticed is the head carried erect, with staring eyes, muscular twitchings and tremblings of the body, staggering, jerky gait, falling down, and struggling; followed by convulsions, paralysis, and death.

Many of the animals die suddenly; others linger on for several days, and finally recover, if removed at once from the disease-producing pasture and carefully nursed. Now, if certain animals recover, there should be great hope of preventing the malady, and I would therefore recommend:—

1st.—That, at the back end of the year, the mowing machine should be run over the land, to cut down all the rough coarse grass; let it lie on the ground to rot, and so act as a manure for the succeeding year's grass.

2nd.—If practicable, apply from 10 to 12 cwt. rough crushed salt to the imperial acre, which will not only kill the grass, but also the tick (providing it has its winter shelter amongst the grass, and that it is the medium by which the disease is spread). If this cannot be done, then

3rd.—Lay large lumps of rock salt all over the pastures, for the sheep to lick at their leisure.

In the West of Cumberland (Millom), a large park, was, for years, notorious for red water and dysentery in cattle, and sheep staggers (loup-ill); as many as 100 fatal cases of the last mentioned occurred in one season. By the application of 120 tons crushed rock salt, the diseases were eradicated. The same success

attended the salt application in both Surrey and Leicestershire, and the result of a 10 ton trial, to a 20 acre field, near Moffat, is now anxiously awaited.

Chorea, Shivering, Stringhalt, and Clicking, are modified forms of a peculiar derangement of the nervous system, characterized by involuntary, spasmodic muscular jerkings, twitchings, and tremblings, and analogous to St. Vitus' dance in the human subject. The cause is not really known; some authorities say, they are due to lesion of the brain, and others, to affection of the spinal cord; there are, however, various theories respecting them.

Although the disease may have a hereditary tendency, my opinion is that, in the majority of cases, retarded dentition has a great deal to do with inducing it (*see pages 112 and 113*), as the complaint is seldom noticed before the animal is rising three years old. It is not so common in the mare; big heavy cart horses are mostly affected, more particularly in the hind extremities. When the fore limbs are attacked, the symptoms are of a trembling character, and best observed while the animal is eating a feed of oats, when the muscles of the shoulders and legs are noticed to be all in a quiver. In other cases, on the horse being put back, it drags its fore feet on the heels, after the manner of one suffering from acute founder. Drinking cold water will also provoke the nervous twitchings and tremblings.

Chorea.—I have, on several occasions, seen a horse, rising three years old, suddenly attacked with acute chorea, when at work in the plough. It would stop, and fall on to its head or side, and sometimes come over backwards; on rising, it seemed to have little or no control over the muscles of the limbs, having both fore and hind legs spread wide apart, to keep it from falling; the head hanging in a listless manner, swinging from side to side. If made to stir, the animal staggers and falls; or it may place its side against a wall for support.

As the case proceeds, and if the patient be turned out to grass, should it trot or canter, it pulls the legs up very high, in a jerky fashion. If it be stopped suddenly, it may perhaps fall on to its head or

shoulder, and go tail over head; or the fore feet may be planted forward like posts, the body swinging from side to side. These cases never sufficiently recover to be of much service in saddle or harness, but may do ploughing and harrowing fairly well. Two drachm doses of bromide of potassium, and 2 scruples of exsiccated sulphate of iron, given daily, followed up with 1 drachm doses of nux vomica, are very beneficial.

Shivering is sometimes readily noticed when the animal is standing in the stable; on being made to move over from one side of the stall to the other, the tail is suddenly jerked upwards and quivers, while the great muscles of the thighs and quarters assume a rigid condition. On putting the animal back, the hind legs are moved in a stiff straddling manner, the animal backing with great difficulty. Horses thus affected, when in the stall, always stand stretched out, with the hind legs back, and the point of the toe in the vannel.

Stringhalt is known by a sudden, spasmodic clicking up of one or both hind legs. It is, at times, seen when the animal is turned quickly round, or if made to stand perfectly still, and then walked smartly forward, when it is *noticed at the first step*. It is also exhibited when forcibly backed or excited, but slight cases are difficult to detect. Cases have been known, where horses have been bred and worked on the farm until they were five or six years old: they have then been "made up," and sold at public auctions without any unsoundness being manifested, but after having been put on Rail, and taken out at the end of the journey, they have been found to be confirmed cases of stringhalt or shivers. Whether this is due to fright on being railed for the first time, or from the jerking they get in the horse-box, while shunting at the stations, is questionable; but it is a matter of great moment to both buyer and seller. It is needless to add that animals affected with these nervous disorders are classed as unsound; yet, they can work for years, and carry very heavy loads *forward*, but have very great difficulty in backing.

Dogs suffer very much from chorea, it being a frequent sequel to distemper (*see page 170*). Fellows' compound syrup of hypo-phosphates can be used with beneficial effect.

PROFESSOR WILLIAMS, in his seventh edition of "THE PRINCIPLES AND PRACTICE OF VETERINARY MEDICINE" (page 479), gives in a tabulated form, the difference in symptoms between disease of the brain substance, and of its coverings. When the substance of the brain is affected, the symptoms are of a quiet drowsy nature, whereas when the coverings are attacked, the symptoms are of a very excitable, convulsive, and spasmodic character.

Phrenitis, or inflammation of the brain and of its coverings, in the horse, is happily very rare. In two cases observed by me, the horses were seized suddenly, and commenced to worry and bite surrounding objects. On putting them into a loose box, they roamed round and round, rushing first to one side, and then to the other, biting at the manger and hay-rick, snapping at the bars of the latter, and even worrying at their own limbs, attempting to climb up the sides of the box with their fore feet, falling over backwards, and when lying on their side, the limbs moved as if in full trot, the breathing was loud and quick, perspiration rolled off their body, eyes were staring, rolling, and bloodshot, mouth open and frothy, and at intervals they gave out peculiar screams or cries; when on their feet, they were dangerous to approach.

While down, they were secured, and well bled from the temporal artery; chloral-hydrate and bromide of potass. were administered, and cold water applied to the head, but all to no purpose, as both animals had to be destroyed.

Organic Changes, such as abscesses in the horse's brain, may arise from complicated or "bastard" strangles.

This pyæmic form of strangles, unfortunately, in some seasons is not uncommon. Like the commencement of all brain affections, when the abscesses are developing in that organ, there is great drowsiness and dulness, the horse hangs its head in a sleepy condition, with pulse full and slow, and breathing quiet and deep; and any food that is taken is eaten in a sort of mechanical manner. As the case progresses, the animal commences to wander round the box, presses its head in the manger, or against the wall, the breathing and pulse

now become quicker, and finally, the animal hangs its head on one side, making it a centre, and day after day, walks, so to speak, round and round its own head.

These cases always end fatally. On *post-mortem*, the brain is found to be a mass of pus, or matter; thus showing, in cases of simple strangles, how necessary it is that every care and attention should be paid at the commencement, and remedial measures adopted to prevent these fatal terminations.

Hydrocephalus, or water on the brain, I have met with in young foals, their foreheads being, as a result, much enlarged and distended. The little animals were very dull and sleepy, yet they took milk freely. As they grew bigger and stronger, the water became absorbed, and the bones of the head flattened down into their normal condition, after small doses of bromide and iodide of potass, with a little exsiccated sulphate of iron, had been given daily. These cases are more frequently found in the fœtus, before birth—in calves particularly—when the bones of the skull have to be broken down with knife, hook, or forceps, before delivery can be accomplished.

Ectopia Cerebralis, where the brain is developed outside the bones of the skull, has been found in cases of parturition, and although the young animals may be fully developed, and born alive, they soon expire.

Tumours in the brain of adult animals are met with occasionally, and they may exist for some time without causing any disturbance, but the first symptoms to be noticed are those described under abscesses. Setons and blisters, behind the ears, may be serviceable, and iodide and bromide of potassium may be given night and morning, in doses of 1 to 2 drachms each.

Tumours of a **tubercular** nature are more commonly found in the brain of the cow, with symptoms analogous to those given under abscesses in the brain of the horse, on *page* 188, including loss of sight, &c.

There are numerous other tumours found in the brain, the chief of these being of the **bony**, and **melanotic varieties**.

Sturdy, Gid, or Turnsick.—This is an affection of the brain due to the presence of a brain tumour, or rather a watery cyst, or bleb, which is the cystic stage of the *tænia cœnurus*—a tape worm affecting the dog. This cyst, which is known as the *cœnurus cerebralis*, is developed from a segment of the worm, which is passed out of the bowel along with the fæces. The segment contains a large number of eggs, and is supposed to be taken up and swallowed along with the herbage on which the animal feeds. On reaching the stomach, the heat therein soon sets the young embryo at liberty, and it is then taken into the circulation, and carried by the blood stream to the brain, which, being its natural habitat, is preferred to any other part of the body, and, therefore, selected for its abode and further transformation. Here, by its hooked processes, it finds its way through the walls of the vessels, into the substance of the brain, and there the cyst, or hydatid, is formed. Should the brain of a sheep, or calf, containing this cyst, be given to a dog, tape worms of this particular kind will again be reproduced, and so the cycle of life is carried on.

Sheep are more subject to this affliction than any other animal, but I have seen a number of young stirks, aged from 12 to 18 months, affected: of these, several recovered after being operated upon.

SYMPTOMS.—The first noticed is gradual loss of flesh by the animal, which carries the head to one side, and walks in a circular direction; or, it may hold the head upwards and backwards, and walk with high-stepping, jerky action. This variation in the symptoms depends upon the part of the brain affected; if, on the right side of that organ, the animal will circle to the left, and *vice-versa*; while, if in the middle, the animal steps high and jerky.

TREATMENT.—Many farmers and shepherds are expert operators for the removal of the cyst. The old method of operation was to determine the situation of the mischief by feeling for a softening of the bone. The wool was then clipped off, and the part burnt through with a red-hot poker; a goose quill was next inserted, and, by its means, the fluid and hydatid sac were removed. A plaster of tar or pitch over the part completed the operation. The new form of

procedure is to open the parts by means of a fine trocar and canula, and to draw off the fluid with the aid of a syringe, the sac being next removed by a pair of forceps. Success in these operations greatly depends on the locality of the tumour.

PREVENTION.—Seeing that the disease originates from a tape worm, in the dog, the prevention is obvious. Dogs either must be kept off the pastures or else they ought to have periodical doses of worm medicine, and, while under treatment, it is well to keep them closely shut up. The heads and brains of diseased sheep should be burnt, instead of being given to the dogs, as is generally the case. Salt applications to the pastures have a good effect.

Concussion of the Brain, in the horse, is generally the result of the animal rearing up and falling over backwards, or of running away and coming suddenly in contact with some obstruction. When there is no fracture or displacement of the bones, the horse may lie quiet (stunned) for a short while, and then regain consciousness, get up and seem none the worse. In these cases, care must be used, and the animal kept perfectly quiet for a few days ; little or no food is to be given for the first 24 hours, and then feed sparingly, for a few days after, with easily digested food.

In other cases, the animal may lie motionless, with little or no sensation, the eye rolling about with the pupil dilated, pulse small and quick, and breathing slow and heavy. These symptoms may last for three or four days, after which, the patient begins to show signs of consciousness, by attempting to raise its head, and if assisted to a recumbent position, by the attendant placing his knee behind the horse's shoulder, it may drink a few mouthfuls of cold water.

Here then, there is a chance of recovery, provided that from the time of the accident, the patient has had every attention, having been carefully turned over from side to side every six or eight hours, and well bedded with clean dry straw, the urine removed with the catheter, and the rectum emptied by the hand every eight hours, and a good dose of opening medicine given at the outset, viz.:—4 to 6 drachms of aloes in solution, combined with 20 ounces of linseed oil.

When the animal shows signs of recovery, by endeavouring to rise, it should be carefully lifted on to its feet, by the aid of slings and chain-blocks; after the first few minutes' struggle in attempting to find its feet, it is astonishing how rapidly recovery ensues.

Again, cases have occurred where portions of the occipital bone, which articulate with the first bone of the neck (atlas), have been fractured, but not displaced, until several hours after. In one case, on the animal falling over backwards, it instantly jumped up, walked about a dozen steps, then fell on its side as if shot, never to rise again, lying with legs extended, eyeballs rolling about, breathing heavily, and giving now and again a few spasmodic struggles with the fore legs; it finally died suddenly, from the fractured pieces of bone becoming displaced, and pressing upon the medulla oblongata—the connecting medium between the brain and spinal cord.

In cases of this kind, it is advisable to keep the animal as quiet as possible, and await results.

Apoplexy is extremely rare, and very sudden in its attack. It may be described as occurring in two forms; from some organic lesion of the brain; or, from reflex functional derangement. In the former it may be due to an overloaded or congested state of the bloodvessels, so causing pressure on the brain substance, or from rupture of a vein with *hæmorrhage*, and the formation of a clot, causing loss of power and sensation. When such cases affect the horse, sensibility and motion are completely lost, a fatal termination occurring in a few hours.

Functional Apoplexy.—This may be best described under that very common complaint known as parturient apoplexy.

Parturient Apoplexy, Milk-fever, or Dropping after Calving.—Of our domestic animals, the cow is by far the greatest sufferer, and, as a rule, is only attacked at the third or subsequent calving. The Ayrshire and Shorthorn breeds seem most predisposed, but in certain localities, and on certain soils, heavy milkers of any breed are liable to it, especially if at grass, when its effects are more fatal than when fed on dry food indoors; it is, however, not

so frequent, nor yet so fatal, when cold east winds prevail. Moreover, it seldom follows where there has been any difficulty in calving, it being most common when the cow has calved without any assistance. The real cause of this so-called milk fever is not yet exactly known. My opinion is that it is due to a succession of shocks to the system—

1st.—The easy expulsion of the waters and calf from the womb.

2nd.—The removal of the calf from the presence of the mother, and not allowing her to enjoy the pleasure of licking and cleaning it with her rough tongue.

3rd.—The exciting and most important shock is the withdrawal of all the milk, at once, either before or after calving, thus removing the pressure too suddenly, which causes paralysis of the milk cells, a total cessation of the milk secretion, and collapse of the nervous system.

Now, if paralysis of the milk-producing parts of the udder is caused by the sudden withdrawal of all the milk at once, the nervous power impaired by the pressure being too quickly removed, and the secretion of milk thus suspended, it stands to reason that the materials which enter into the composition of the “colostrum,” or “beastings,” which are, at this time, contained in the system of the cow—more particularly if a deep milker,—should be eliminated from the body by the action of the udder. But the udder is not working, and so these elements are retained in the circulatory system, not only acting as a foreign body, but assuming a toxic action, which irritates the nerve centres, causing the peculiar excitement seen early on, which is succeeded by total prostration of the whole nervous system, in which all the organs of the body participate, followed by congestion of the structures.

SYMPTOMS.—As a rule, these are noticed from about four to six hours after the second milking, or from a few hours after calving, up to, say, the fifth day, or until the beastings are cleared out of the system. The first symptom to be noticed is a peculiar thoughtful expression of the face, manifested by a holding up of the head, and a

pointing out of the nose, while the eyes stare right in front; there is paddling of the hind legs, and switching of the tail, and the animal staggers about the stall with a peculiar spasmodic rigid twitching of the muscles, in the region of the stifles, which seem to be pulled backwards, and to a certain extent, are beyond control. This is followed by a stage of excitement, when the animal tumbles all over the place, first on to its shoulders, then on to its head; or, it may fall on to its side, and lie with its legs extended, breathing heavily, stomach distended like a drum, tossing the head about, rolling the eyes, and finally sinking into a deep coma; again, it may fall on to the breast bone and belly, roll the head from side to side, and then turn it towards the flank, resting the lower jaw on the ground, and in this position falls into a comatose condition (*see diagram*).

TREATMENT.—This is not always as satisfactory as could be wished, depending as it does upon the nature and severity of the attack, and upon the age and condition of the patient. The earlier the attack, the more difficult is its treatment.

The normal temperature of the cow ranges from 100° to 102° , yet in milk fever cases, the temperature, as a rule, falls to 99° or 97° . Should the temperature rise to 104° or 105° , and the animal be very wild and excitable, the abstraction of from 3 to 5 quarts of blood, has a beneficial effect. Follow this up by washing the body all over with several pails of cold water; scrape well down, and apply a sheet wrung out of cold water, over which put two or three dry woollen rugs and a waterproof to cover all; give a dose of chloral hydrate and bromide of potass., $\frac{1}{2}$ oz. to $\frac{3}{4}$ oz. of each, in cold milk; next give 2 lb. of castor oil, and 2 lb. of treacle, in gruel, as a drench. But if the temperature does not rise, and the patient is fast becoming comatose, still apply the cold water bath and the wet pack as already shown, and administer 2 quarts of warm ale, 2 lb. treacle, 2 lb. castor oil, and 2 oz. mustard; keep the animal trussed up on its breast bone and belly, with bundles of straw, or bags of chaff, or sawdust; *never allow the cow to lie on its side*. Having given this medicine, leave the patient alone, with the exception of turning it from one side to the other, every 6 hours. The hand should be well

soaped and introduced into the rectum, and the hard-baked dung cleared out, and, if necessary, the catheter passed and the urine removed.

When coma sets in, never attempt to force anything down the animal's throat, as there is great danger of its passing down the wind-pipe on to the lungs, producing congestion, and perhaps a fatal lung affection. Subsequent treatment must be adapted to the progress of the case. If in the course of from 12 to 24, or even 36 hours, the patient begins to show signs of returning consciousness, by holding the head up, pricking the ears, and looking round, it should be offered a few mouthfuls of cold water, bran, or hay tea; after a little while, it will attempt to rise to its feet, and evince a desire for food by eating the bedding, while the secretion of milk returns; when this takes place, nothing more is required but nursing the cow for a few days. A small quantity of milk should be removed at intervals of from 6 to 8 hours. I do not agree with continually drawing off the milk as fast as it is secreted, and therefore recommend leaving some in the udder to promote further secretion. Frequent hand rubbing is also of very great service as a stimulant to the gland.

TERMINATIONS.—In many cases, after the apoplexy has passed off, the secretion of milk has returned and the animal is feeding and chewing the cud, yet it cannot get up. In some instances the patient recovers the use of its limbs in the course of from three days to three weeks, or it may linger on for six or seven weeks, having to be turned from side to side, four or five times in the day, and although it regains the use of the fore limbs, the hind ones remain paralyzed, and the animal is subsequently sold to the butcher. Again, according to the severity of the attack, the case may terminate fatally in six or eight hours, or it may linger on in a comatose condition for thirty hours. If the patient gets into a relaxed condition, settles flat down into the bed, and seems to lose all tone of the muscles, has the hind legs wide apart, sits on the hocks, the points of which stick out below the rump bone, breathes heavily, puffs at the cheeks, drops the lower jaw, and shows no sensation when the eyeball is touched, its condition may be looked upon as hopeless.

Sometimes gangrene takes place in one of the hind quarters of the body, arising either from rupture of a blood-vessel, or from extreme congestion. The animal thus affected may regain consciousness, and even take food, but the breathing is very quick and laboured, the affected quarter swells up, and on being tapped by the fingers, it has a rattling sound; this has a fatal termination. Now and again an odd case survives the attack, and so far recovers that it commences to feed, chew the cud, and seems to do well for five or six days, after which it begins to cough, loses its appetite, and finally dies from breaking up of the lungs, or what may be termed acute consumption, caused by the congested state of the vessels of the lungs during the coma, or from matters, that have been horned in, falling into the windpipe and bronchial tubes.

From experience, I would recommend the butcher before the doctor, in all cases after the fourth calving, if the animal is in prime condition and the attack severe.

PREVENTION.—*First*—If possible, do not turn the cow out to grass until it has calved, and give plain food of not too watery a nature.

Second—Immediately the cow shows signs of calving, have it removed to a loose box for that purpose, and leave it there with the calf for four or five days, or until the beastings are all cleaned out; this is best known by boiling the milk, when, if present, the milk will curd. It is a good practice to remove a little milk from the udder occasionally by the hand.

Third—Five or six days before due, give 2 lb. castor oil, in treacle gruel, and repeat the dose in 24 hours, or as near that time as possible, prior to calving; this is of the greatest benefit. Salts do not answer in my district, neither before nor after calving.

Fourth—If the calf and mother cannot be left together for four or five days, then only small quantities of milk should be withdrawn every four or five hours. *Never, on any account, take all the milk at once from the big congested udder of a deep milker.*

Spinitis.—Inflammation of the spinal cord and its coverings. This may occur in an acute or chronic form, but either is very rare. It may arise from rheumatic affections, and injury to the backbone from concussion, &c.

In the acute form, the animal is suddenly attacked, showing great pain, and perspiring freely. It throws itself down, rising again with great difficulty, and strong muscular contortions are evident,—in fact, the symptoms resemble an acute attack of inflammation of the bowels, or azoturea.

TREATMENT.—Give nerve sedatives, such as chloral hydrate, belladonna, or hypodermic injections of morphia, along with a good dose of opening medicine, such as linseed or castor oil. Hot water blankets should be applied constantly to the back, and the rectum must be emptied by the hand, and the urine drawn off by the catheter.

From the effusion which takes place in the spinal canal, the cases usually terminate fatally, or at least in paralysis.

Paralysis, or Stroke.—This may be described as *complete*, *partial*, *local*, or *reflex*, being sudden loss of power, either with or without sensation ; it may, however, come on gradually.

Complete,—when motion and sensation throughout the body are suddenly arrested, as—milk-fever, stomach staggers, acute lead poisoning, &c.

Partial,—when only part of the body is affected.

Local,—when only some of the muscles are involved. This form is frequently seen after influenza, and strangles, when the muscles of the head and lips of the affected side hang loose and pendulous, the tongue also sometimes suffering. The animal, on getting food into its mouth, has no power to roll it for mastication. In these cases the food has to be removed by the hand.

Reflex.—This may arise from impaction of the stomach and bowels of both cattle and horses. It is also caused by pressure and obstruction in the urinary and generative organs. Cattle will sometimes

lie for four or five weeks before calving, without having the power to rise, and, after parturition, get up without any assistance.

Hemiplegia is when only one side of the body is attacked.

Paraplegia when either the fore or hind part of the body is affected.

Seeing that there are so many different causes, it is highly important to call in professional aid at the onset, and have the animal treated accordingly.

Rabies.—This frightful malady, although formerly described as an affection of the nervous system, is now considered to be due to the action of a microbe, which gains entrance to the system. Of all the animals that are subject to its baneful influence, those of the dog tribe seem to be most prone. In some cases, the patient has a great horror of water, the sight of which brings on a peculiar tetanic spasm of the gullet, causing inability to swallow (hence the name hydrophobia). This symptom is more noticed in the human subject than in the lower animals, as a rabid dog will, at times, go into the water, if in its way, and lap it freely. It is generally thought that extremely hot weather favours its occurrence, but, as previously stated, it depends upon the introduction of the disease-producing germ into the system. This is generally accomplished by means of a bite from a rabid animal, but accidental inoculation may take place, through an abrasion or sore on the skin being licked by the tongue of an affected animal. It has been observed, that, the time varies to a great extent, from the introduction of the germ into the body, and the period at which the malady is made manifest; in some cases, only a few days elapse, while in others, months, and even years, intervene.

SYMPTOMS.—In this, as in most affections of the brain and nervous system, the first thing noticeable, particularly in the dog, is that of great dulness, accompanied by periods of excitement, without apparent cause. An affected dog has a tendency to eat all sorts of rubbish, dirt, feathers, leather, &c.; it snaps and bites at anything which may come in its path, but will not go out of its way to do so. Again, the nature of the animal is quite changed; if it has previously been very mild

and docile, it will become quite irritable and inclined to bite its best friend, and *vice versa*. It also has a tendency to take off by itself, going with a peculiar lounging, swinging gait, taking little or no notice of anything unless interfered with. The head and ears hang in a limp, loose fashion ; it foams at the mouth, and its eyes are bloodshot, with a peculiar sullen far-off look. The bark or howl of a rabid dog once heard, is never forgotten. If the animal is not destroyed, death is generally preceded by convulsions and paralysis. On account of the great danger following in the wake of a rabid animal, it should be destroyed, immediately the fact of the disease has been established. Directly a bite is inflicted, the parts ought to be well washed with a mixture, made of one part carbolic acid, and four parts water; or it should be dressed with tincture of iron. Caustics in solution answer best, as they get well into the bottom of the wound; solid caustics are not so reliable.

Pasteur, the great French scientist, has, for a number of years, devoted a great amount of time and ability to conducting experiments, in order to find a preventive of this direful scourge. He has found, that certain portions of the spinal cord of rabbits, which he had previously rendered rabid, by inoculating with the *virus*, can be attenuated to a variety of strengths. When these preparations of modified cords are injected daily into the body of a patient that has had the misfortune to be bitten by a rabid animal, the body is said to be rendered immune from the disease. The reported success which has attended this treatment, and the large number of cases that have been inoculated, almost render it imperative that no time should be lost in placing a bitten subject under his care and treatment. The idea of the inoculations is, to bring the structures of the body into such a condition, that the rabid virus fails to find suitable food for its development and multiplication. In this way, the disease may be prevented.

Tetanus, or Lock-jaw.—This is characterised by a continuous, stretched, tense, and rigid condition of the voluntary muscles of the body. It is of a fearfully fatal nature, and, in some cases in its acute and later stages, simulates *Rabies*. Until very lately, it was described

as an affection of the nervous system, but it is now said to be due to a germ termed the *drum-stick bacillus*, so called from its resemblance to a drum-stick.

Tetanus is of common occurrence in the horse, more particularly in hot climates, and is met with in three forms,—acute, sub-acute, and chronic,—the first being the most fatal. It was formerly classified under two heads, and when no cause could be found, it was called *idiopathic* tetanus. The other, arising from a wound with an external opening, was termed *traumatic* tetanus. Now, when no wound can be observed, it is supposed that the bacillus finds its way into some lesion in a mucous membrane, where it can establish its action.

Tetanus commonly follows wounds in the extremities, particularly punctured wounds in the feet (the majority of my cases have resulted from these); it also supervenes on operations, such as castration, docking, &c., no matter how skilfully they may be performed. Experimental microscopists tell us that the disease-producing germ is found in garden mould, and that tetanus can be produced by inoculation with such soil. This appears strange, as it is a very common practice of mine, on seeing a wound showing signs of healing, to leave it exposed to the action of the air, and order *fine dry soil* to be dusted over the raw surface. The soil I find to be a good absorbent and deodorizer, and, as a rule, the wound heals quickly. I cannot call to mind a single case of tetanus following this treatment.

There, however, must be something, either in the air, surface soil, or temperature, to account for this disease, as, during a period of 35 years, only one case of tetanus in a horse, at the bottom of one of the many coal mines visited, has come under my own observation; and, as a rule, the principal portion of the cases met with in the pit-bottom are wounds in the feet.

There are three terms used to designate the varieties of tetanus, viz :

Opisthotonos,—when the head is pulled upwards and backwards, and tail raised by the tense contraction of the muscles of the back. This form is mostly observed in the horse.

Emprosthotonos,—when the head is depressed and pulled down; and

Pleurosthotonos,—when the head is drawn to one side.

The last two I have never seen in the horse, but have noticed them in the human subject.

Tetanus generally makes itself manifest from about the sixth to the tenth day after an accident or operation, just when the wound is healing. If the wound is closely examined, it will be observed to have a peculiar dusky copper colour, and not that bright strawberry-red seen in healthy granulations.

The organism, or bacillus, that is supposed to cause the malady, is said to confine itself to the wound and its immediate surroundings, and excretes or manufactures a material which being absorbed into the tissues, acts upon the nervous structures, and produces the disease.

Now, with reference to these so-called disease-producing germs, spores, microbes or bacilli,—in other words, the seeds of the disease,—these have, for some time past, been experimented with by a number of microscopists in the laboratory, cultivated, grown, and tested with suitable food (medium), air, moisture, and temperature, and their specific nature determined by inoculation, according to the particular disease to which they belong; but when a disease appears on the farm, or in the fold, there seems to be something else wanting. It has been observed that some of these specific germs, like the germ of wheat or of other grain, retain their vitality for a considerable time in a dry condition, and that they are ever present with us in air, water, and food. Now, if they are so ready to establish their action when cultivated in the laboratory, all conditions being suitable, how does it happen, that the various specific diseases these germs are said to produce, do not occur every moment, and all animal life be destroyed? Or, is it because, like plant seeds of every kind, the surroundings must be replete with every necessary favourable to their germination and development; or is there some peculiarity in the atmosphere, locality, food, or other influences, acting upon, and bringing the body of the patient into such a condition that the particular specific germ, common to the malady, finds suitable material for germination and growth?

SYMPTOMS.—Tetanus in a mild form is not so readily detected, but in its acute stages the symptoms are more prominent. The first to be noticed is: If the animal is made to walk, it moves stiffly, and with a wooden gait. The head is extended forward, nose pointed out, ears pricked out in front, straddling of the hind legs, the hocks of which are turned out, and the tail raised and shaking. If the animal is in the stall, the hind legs are placed backwards, wide apart, with the points of the hocks turned out, the tail elevated and quivering, the head pulled up, and the eye very watchful; the slightest noise seems to aggravate the symptoms. On approaching the head, the animal recedes and drags the fore feet backwards, raising the head higher; the eye-ball is drawn back into the socket, and the haw (*membrana nictitans*) is stretched across the front of the eye, giving it the peculiar appearance of a squint. The latter is looked upon as a confirming symptom, yet the jaws may still be slightly movable. But, as the case proceeds, the symptoms become more pronounced; the muscles of the face have a tense pinched appearance; the nostrils are wide open, and there is foaming at the mouth. If the animal is made to move round, it turns like a solid block, with its fore legs wide apart. Patches of perspiration are noticed on various parts of the body, and, in some cases, it sweats profusely all over. At first, the pulse is not much affected, but finally becomes quick, hard, and oppressed. The moment the animal ceases to breathe, all the muscles of the body become relaxed, soft, and flabby.

TREATMENT.—Having seen a large number of cases, various modes of treatment have come under my notice, such as bleeding, physicing, hot fomentations, applying a newly flayed sheep's skin to the body, or heavy woollen rugs, giving prussic acid, belladonna, aconite, chloroform, chloral hydrate, bromide potass., opium, &c., &c., recovery being sometimes attributed to one thing, and sometimes to another. My greatest success, however, has been in getting the affected animal into a quiet, secluded, well-ventilated, loose box, and supporting it with slings to keep it from falling, for if it once gets down, it very rarely gets on to its legs again without assistance.

If called to the case before the jaws become closed, and there is opportunity for giving a dose of medicine, a 6 to 8 drachm dose

of physic must be given, on the end of a small cane, taking great care not to excite the animal. Sheets and rugs are then to be removed, as they only aggravate the patient; leave the body without any covering, as cold acts as a grand sedative. Cases recover more readily in extremely cold frosty weather, than in hot. If there be an external wound, clip off the hair from about it, and wash well with Little's phenyl, one part, and cold water, 60 parts; then apply tincture of iron to the wound, and cover it well up with a good plaster of extract of belladonna, spread on a thick layer of cotton-wool. Great success has attended this mode of treatment, accompanied by alternate hypodermic injections of pure carbolic acid (B.P.) and glycerine, and a mixture of morphia and atrophine, 30 to 40 drop doses of each, every 6 or 8 hours, at the same time giving 1 to 2 oz. sulphate of magnesia, or hyposulphite of soda, dissolved in a pail of cold water, cold hay-tea, or milk and water, placed in front of the patient in such a position, that it can suck in the fluid at its leisure. Repeat this daily, if necessary; and if required, warm water injections with 1 to 2 oz. of glycerine can be given, three or four times in the 24 hours. All solid food should be withheld until the animal is so far convalescent as to be able to assimilate such food; then, well-boiled barley and bran are strongly recommended with green food (if it can be had), carrots, &c. It usually takes from six to eight weeks before recovery can be boasted of.



THE EYE.

Or organ of vision, is of globular shape, and consists of a fibro-membranous sac, containing transparent humours of different densities, which act as reflectors. It is attached to its bony socket by various muscles, and sustained in a steady position by a cushion or pad of fat. This pad, in old age, becomes absorbed, and the upper portion of the eye sinks.

Protecting the front of the eye, we have two movable curtains, the upper and lower **eyelids**; the upper—being the larger, and more movable of the two.

The **Eyelids** are composed of:—

- 1.—*Skin*, externally.
- 2.—*Muscular fibres*, to control their movements.
- 3.—*Tarsal cartilage*, to give stiffness and shape.
- 4.—*Conjunctiva*, or mucous lining, which is also reflected over the front of the eye, or cornea.
- 5.—*Meibomian glands* are found on the margin of the eyelids, and secrete an oily material, which prevents them gumming together.
- 6.—*Eyelashes* are the fine hairs, found on the free edges of the eyelids, more abundant on the upper lid, and assist in preventing the entrance of foreign bodies.

Lachrymal gland is situated on the upper portion of the eyeball, and secretes the tears, which keep the front of the eye moist and clear; they then pass through the **lachrymal duct** into the nose.

Membrana nictitans, or **haw**, is a cartilaginous structure, situated in the inner corner or *canthus* of the eye. Its function is to remove foreign bodies, and shield the eye.

The eyeball is composed of three coats, viz.:—

- 1.—The **sclerotic** and **cornea** layer.
- 2.—**Choroid** and **iris**.
- 3.—**Retina**.

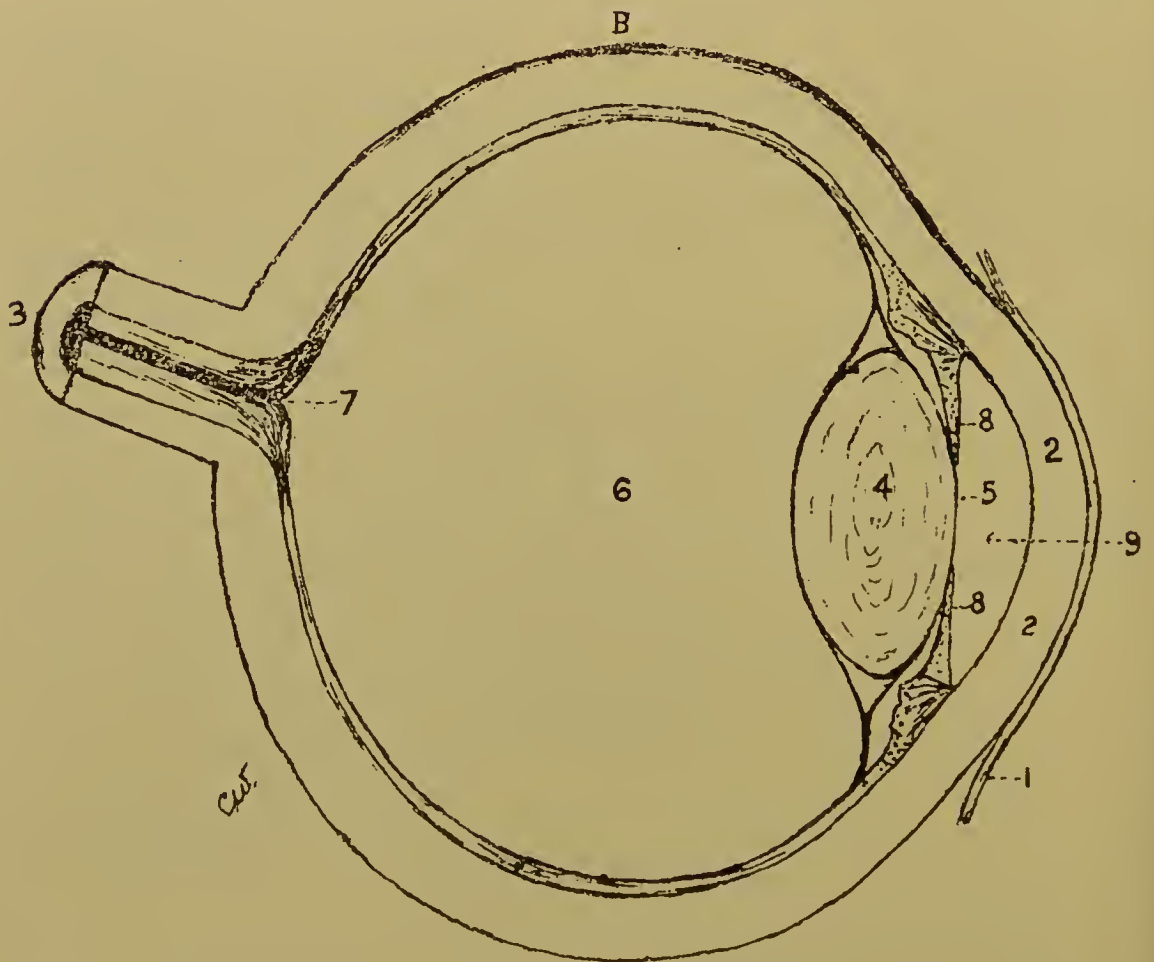
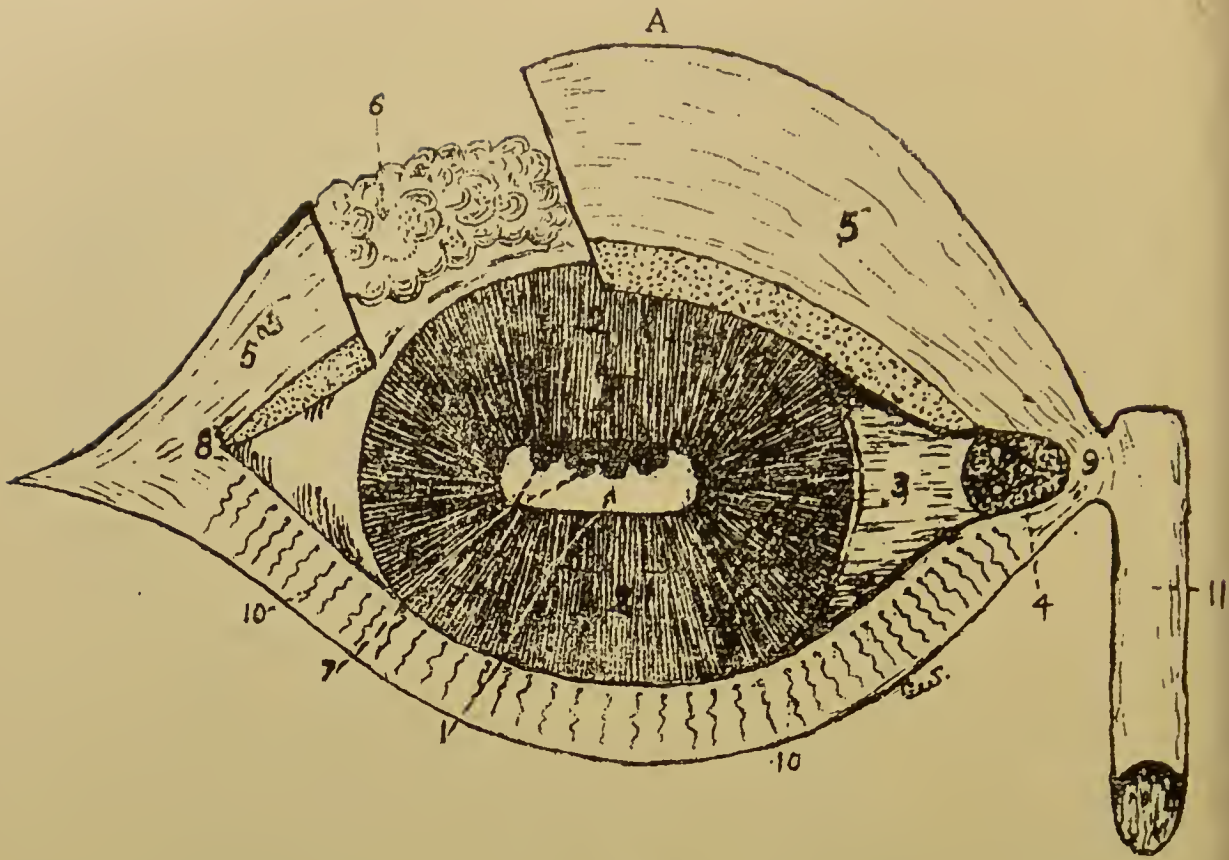


PLATE XXXI. (Original—WARD.)

THE EYE.—A.

1. Pupil.
2. 2. The Iris.
3. Membrana Nictitans or Haw.
4. Puncta Lachrymalis.
5. Upper Lid cut across showing 6.
6. Lachrymal Gland.
7. Corpora Nigra.
8. Outer Canthus.
9. Inner Canthus.
10. 10. Meibomian Glands.
11. Lachrymal Canal.

Section of Eye.—B. From FURNEAUX, (WARD.)

1. Conjunctiva.
2. 2. Cornea.
3. Optic Nerve or Nerve of Sight.
4. Crystalline Lens.
5. The Pupil.
6. The Posterior or Vitreous Chamber.
7. The Blind Spot.
8. The Iris or Coloured Part.
9. The Aqueous Humour.

The **sclerotic coat** is a very dense structure, formed of white fibrous tissue, to which are attached the muscles which move the orbit. This coat forms four-fifths of the external tunic.

The **cornea** is that transparent elliptical portion of the external coat, situated in the front of the eye; it fits into the sclerotic, similar to the glass in a watch, so forming the remaining fifth of the outer envelope.

The **choroid coat** consists of three layers; external—principally of minute veins; middle—plexus of small arteries; and internal—a dark brown pigmentary layer.

The **iris**, or curtain, is connected with the choroid, and may be of various colourings; in the horse, it is generally dark brown. The opening in the centre of the iris is called the **pupil**, which, in horses, is of oblong shape. The muscular fibres of the iris are arranged in two ways:—a circular layer, and a radiating layer; the former contracting, the latter dilating the pupil.

Some horses have a white, unpigmented iris, and are therefore called “wall-eyed,” or “albinos.”

Corpora nigra are small black bodies, of a globular shape, observed in front of the papillary opening, oftener seen on the upper fringe of the iris; their use is supposed to be to modify the rays of light.

The **humours** of the eye are—the aqueous, the vitreous, and the crystalline; they act as reflective media.

The **aqueous** is in front, between the interior surface of the cornea, and the crystalline lens. It is composed chiefly of water, with an alkaline reaction.

The **crystalline lens** is bi-convex, more flattened in front than behind. It is made up of concentric layers, like an onion, and is enclosed in a capsule. It is situated behind the iris, having the aqueous humour in front, and the vitreous behind, and being held in position by the ciliary ligament and muscle. It is transparent, its object being to concentrate the rays of light to a focus.

The **vitreous humour** occupies the posterior chamber, which constitutes about four-fifths of the interior of the sac. It is an albuminous semi-fluid, of a jelly-like consistency, and is enclosed in a structure termed the *hyaloid membrane*.

The **retina** is the expansion of the optic nerve. It is composed of several layers, consisting of rods, cones, &c., and is the essential part of the organ of vision. The **optic nerve** enters the eyeball, in company with the *ophthalmic* artery and vein, at the back of the eye (*see diagram*).

The muscles of the eye are—the Retractor, Abductor, Adductor, Depressor, Levator, and superior, middle, and inferior Obliques. These muscles turn the eye in the various directions required.



INJURIES AND DISEASES OF THE EYE.

The **Eye**, although well shielded by a strong bony socket, cartilaginous, muscular, and membranous structures, is frequently subject to injury and disease.

The **eyelids** are sometimes injured, as a result of fighting,—more particularly in dogs; in the horse, the upper lid is occasionally torn by hooks, nails, &c. Should the piece hang down over the front of the eye, the best plan is to cut it off, and treat the place as a simple wound, or, if practicable, a suture or two may be put in, and the wound covered with collodion. Warty growths, when present, can be removed with the scissors or the knife.

The eyelids may become inverted, or everted; when the former happens, the eyelashes turn inwards and irritate the front of the eye; when the latter occurs, they turn outwards. Both cases cause much pain and annoyance, and have to be relieved by an operation, which consists of cutting a piece out of the lid. The succeeding inflammation should be treated with the following soothing eye lotion:—boracic acid, 1 drachm; wine of opium, 2 drachms; rose water, half-a-pint; apply with a soft sponge night and morning. If great pain be present, a solution of cocaine, or extract of belladonna, may be used; the animal should be kept in a dark place, and fed on a cooling diet.

The **membrana nictitans**, or **haw**, is subject to irritation and inflammation, but is more prone to warty growths, and soft, spongy, and cancerous tumours. The warts may be successfully cut off with the scissors, but in removing the soft tumours, the haw, in some cases, has to be excised altogether. After the operation, the parts should be dressed with the boracic lotion, as already recommended. These growths are more frequently seen in the cow, than in the horse.

Old-fashioned farriers used to cut the haw out for an imaginary complaint in pigs, called the “howks,” which was really indigestion; they took up the haw with a needle and thread and cut it out with the scissors.

Conjunctivitis, or simple ophthalmia.—Inflammation of the external coat of the front of the eye, or cornea, extending to the lining of the eyelids.

This is generally the result of an injury, such as a blow from a stick or lash from a whip, but extreme hot or cold weather will also produce it, more particularly in sheep and lambs, during the cold, frosty, spring months. Bad ventilation and drainage, favour its occurrence; but perhaps the most frequent cause is the entrance of foreign bodies, such as sand, hayseed, chaff, &c.

SYMPTOMS.—The eyelids are more or less closed and swollen, tears flow freely down the side of the face, and the patient cannot bear exposure to the light. The lining of the lid is very red and congested, and the front of the eye has a peculiar, pale blue, milky hue, especially at the seat of the injury. Constitutional disturbance, may, in some cases, be present, with fever, which must receive attention and be combated with suitable medicines.

TREATMENT.—A careful and minute examination must be made, and, if the cause is due to some foreign body, which is not buried in the exudation that usually follows, it may be removed with a straw, a feather, or the corner of a handkerchief; but a pair of forceps, with fine rounded points, is best. Should the eye be very sensitive, and pulled back into the socket, as is often seen in the cow, so that the object cannot be reached, a little of a 5 to 8 per cent. solution of cocaine should be put into the eye, when, in the course of from 15 to 20 minutes, the offending body may be removed.

On no consideration should alum or powdered glass be blown into the eye, as is too frequently done; these are highly dangerous, and cause a great amount of pain to the animal. They are, therefore, strongly condemned. Bathing the eye, three or four times a day, with cold water, and then applying the eye lotion already named, is all that is necessary.

Sheep and lambs, when affected, should be removed to better shelter, and the eye sponged once or twice a day with the boracic lotion.

These cases, if not properly attended to, may result in ulceration of the cornea, and even fungoid growths may spring up; then, more heroic treatment is required; touching the places with nitrate of silver, every second or third day, has a beneficial effect. In very severe cases, the ulceration extends through the external coats, the humour escapes, and the eye is lost.

Periodic Ophthalmia.—This differs very much from simple ophthalmia, in attacking the internal structures of the eye, usually the anterior chamber. Formerly, it was supposed to come on with the changes of the moon, and got the name of *moon blindness*, whilst, on account of its tendency to recur, the term periodic was used.

It is not so prevalent as it used to be, and when it does occur, town horses, as a rule, are the sufferers. Its causes are not well understood, but are generally considered to be of a constitutional character; sudden changes from heat to cold, bad ventilation, and defective drainage, are blamed. In my opinion, one great cause is from an injury brought about by the horse throwing up its head, in a low-roofed stable, thus hitting itself behind the ears, or by the infliction of a brutal blow from a stick in that region. Some think it has a hereditary tendency; such has not been my observations.

SYMPTOMS.—As a rule, the attack is sudden, the horse is very dull, hangs its head, and has one or both eyelids closed; the upper lid has a flat and wrinkled appearance, owing to the eye being pulled back into its socket. The animal cannot bear the light, and, on examining the eye, it is found to be dim, having lost its lustre, the front chamber appearing of a yellowish amber colour, sometimes of a reddish brown, and the pupil can scarcely be seen. Frequent attacks complicate the crystalline lens, and finally end in cataract.

TREATMENT.—Put the animal into a roomy, well-ventilated, but darkened loose box, keep it perfectly quiet, and administer mild doses of laxative medicine, say, 2 ounces epsom salts, and $\frac{1}{2}$ ounce cream of tartar, night and morning, in a mash of bran, or as a draught, until the bowels show relaxation.

Sponge the eye with a weak solution of extract of belladonna, two or three times a day; this treatment, in some cases, may be all that is required. In protracted cases, I have found great benefit arise from the application of a blister on the side of the cheek, or behind the ears.

I have had cases in bulls, especially young ones, where the aqueous humour has been rendered opaque, in fact, nearly milky white, from excessive sexual exertion. The animal must not be used in the meantime, but be kept perfectly quiet, in a dark loose box, and the eyes bathed for 15 to 20 minutes, several times a day, with cold water.

Cataract is a pearly white appearance, or opacity, of the crystalline lens, or its capsule, or both. It may result from external injury to the eye, or from frequent attacks of inflammation, or periodic opthalmia; again, it may be congenital, and found in one or both eyes. The whole, or only part of the lens may be affected; various names being given accordingly.

Lenticular Cataract.—When the lens itself is the seat.

Capsular Cataract.—When only the capsule is affected.

Capsulo Lenticular.—When both are implicated.

Old dogs seem to be the greatest sufferers, and in these, it generally comes on gradually. In the human subject, the lens can be removed, and suitable glasses substituted; but in the domestic animals, treatment is of little use. When the eye is injured, or undergoing severe inflammation, the great point is to use every endeavour to prevent a cataract forming.

In examinations of horses for soundness, it is of the greatest importance that the eyes be carefully examined, as cataract causes partial or complete blindness. The horse must be taken into a dark place, and the eye examined with a lighted candle; if the eye is correct, the pupil will contract gradually, on the light being presented; a clear, deep, black-blue, liquid appearance will be seen beyond the pupillar space, and the image of the light from the candle be reflected in three distinct places. On moving the candle to and

fro, the reflected lights move at the same time, but if cataract be present, the pupil remains stationary, and a pearly white substance is seen, filling up the pupillary opening.

Amaurosis.—This, strictly speaking, is not a disease of the eye itself, but a derangement of the “optic nerve,” producing partial, or complete loss of sight. The eye appears to be fuller, brighter and more brilliant than usual; at the first glance, it seems a beautifully developed eye. When it occurs, both eyes are affected, as a rule.

In the majority of cases, the horse carries his head well up, and steps very high, in a hesitating, jerky manner. On carefully examining the eye, the pupillary opening is very much dilated; instead of being elliptical, it is nearly circular, very little of the iris being seen; whilst on being subjected to the rays of a strong light, the pupil will not contract.

Detection of amaurosis, is really of more importance in examination for soundness, than that of cataract.

Filaria Oculi. or worm in the eye, is extremely rare in this country, but is frequently seen in hot climates, *e.g.*, India. It is called the *strongylus filaria*, and measures from half to one inch long; it is found in the anterior chamber of the eye, where it moves about freely, setting up irritation, and giving to the aqueous humour a peculiar milky hue. It can be successfully removed by casting the horse, and cutting into the eye at the upper edge of the cornea, so liberating the humour, and with it, the offending worm.

There are several other diseases of the eye, such as *Nebula*, *Glaucoma*, *Staphyloma*, *Tuberculosis*, &c., but as they are of rare occurrence, I will not dwell upon them here, but pass on to

Dislocation of the Eyeball, which is mostly seen in the dog, as a result of fighting. When recently done it is readily reduced, by pressing it carefully back into the socket with the thumbs, and pulling the lids forward with a pair of forceps; keep it in its place with a bandage and a pad of wet lint. When it has been displaced for some time, and become swollen and congested, it should be bathed well with tepid water, or an infusion of poppy heads; it may be necessary

to slit the eyelids at the outer corner, before returning ; then maintain it in its place, by one or two stitches of antiseptic thread, covering all with a wet lint pad and bandage.

In some cases, the eyeball is so much damaged that it has to be removed.



THE EAR.

In the horse, the ears should be fine, and well pointed forward, and when at work, should always be on the move, first backward, and then forward, so as to catch sounds. Each ear is made up of three distinct portions, as under :—

External Ear, made up of three pieces of cartilage :—

1st.—*Conchal*, which forms the point.

2nd.—*Annular*, ring-shaped at the bottom.

3rd.—*Scutiform*, triangular, acts as lever to move conchal.

These are covered internally by fine skin, containing minute glands, which secrete wax, to prevent insects and other foreign bodies entering.

Middle Ear, or bony cavity, contains the *tympanum*, or drum, and four small bones :—

1.—*Malleus* or *Hammer*.

2.—*Incus* or *Anvil*.

3.—*Stapes* or *Stirrup*.

4.—*Os-orbiculare* (the smallest bone in the body).

The tympanum, or drum, is acted upon by the sounds which set the small bones to work to convey the sound to the internal ear.

The tympanum is lined in front by a fine vascular mucous membrane, which is connected to the *eustachian* tube, the *guttural pouches* and *pharynx*, or throat. The eustachian tube conveys air to the middle ear from the pharynx, so if the tympanum is forced inwards, the air from the eustachian tube forces it out again.

Internal Ear is very complex, and is called the labyrinth, which is made up of *bony* and *membranous* parts.

The *bony part* contains: 1.—*The Vestibule*; 2.—*Semi-circular Canals*; 3.—*Cochlea*, or shell. The phenomena of hearing are very interesting, and worth reading up, and the same may be said of sight—*vide* HUXLEY'S ELEMENTARY PHYSIOLOGY.

Fortunately, we have very few diseases of the ear in horses; they may, however, get torn or wounded, and are prone to warty growths, which must be removed by operation. Sometimes we have a sinus running up the edge of the ear, the bottom of which, has been found to contain a small rudimentary tooth.

Canker of the ear, is mostly seen in dogs that have little to do, and are over-fed. Heavy-eared dogs, as spaniels and retrievers, seem to be predisposed to it. When affected, the dog holds its head rather to one side, every now and again shaking it, and flapping the ears, which it scratches with its feet. On examination, a nasty, fœtid discharge is seen in the hollow of the ear.

TREATMENT.—Washing with warm water seems to aggravate and extend the disease. Wipe the affected part as clean as possible, with medicated cotton wool, then put a few drops of creosote, or oil of cloves into the ear, and rub well in from the outside, but the best, and most radical treatment, is to puff into the bottom of the ear a small quantity of iodoform, every third day; at the same time, giving a dose of castor oil and syrup of buckthorn, and changing the diet.





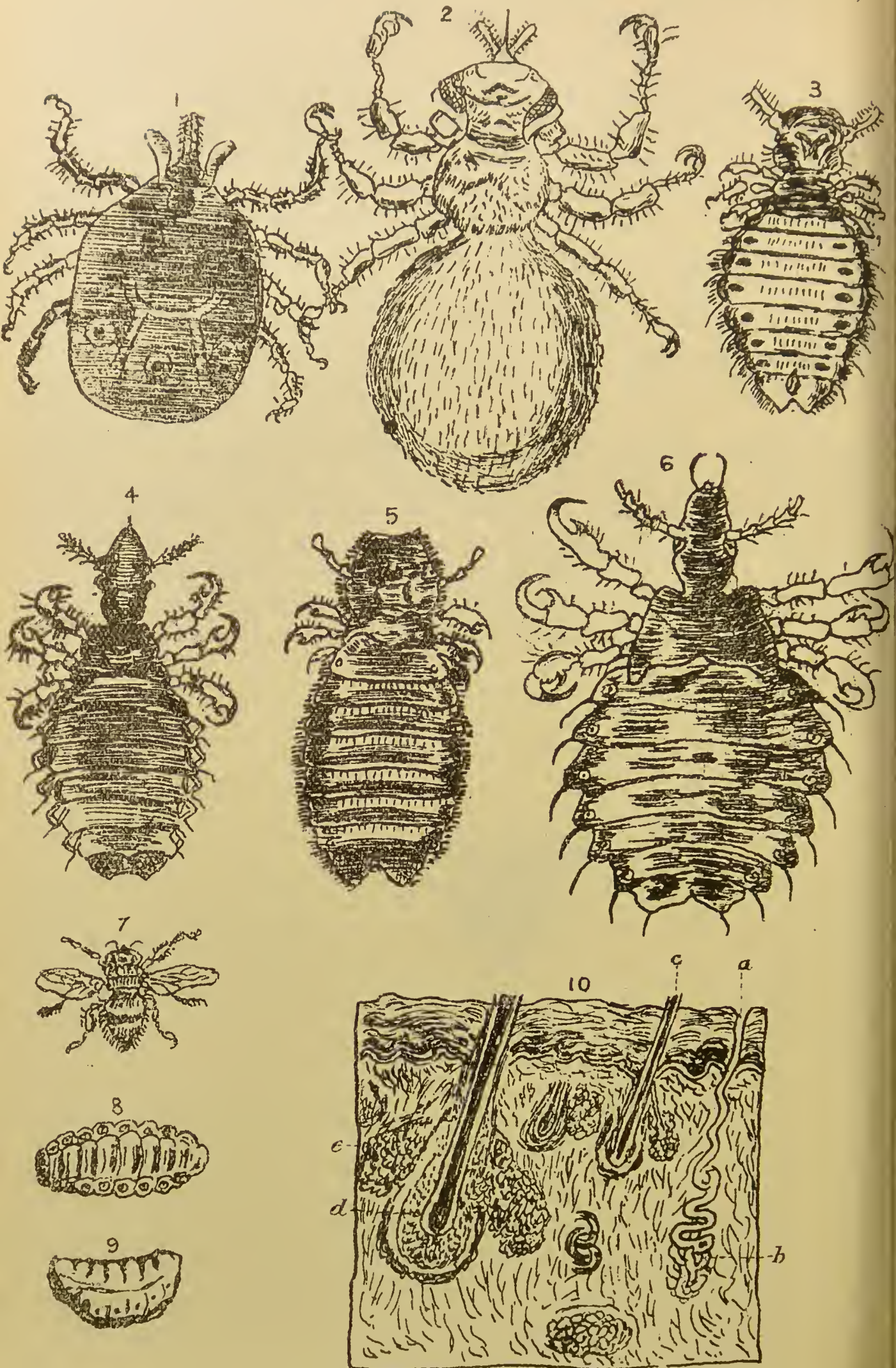


PLATE XXXII. From BROWN'S *Animals of the Farm* (SCOTT.)

THE SKIN, AND SOME OF THE PARASITES.

1. Tick, infests Dogs and Sheep.
2. Tick or Ked of Sheep, enlarged.
3. Sheep Louse, enlarged.
4. Horse Louse, do.
5. Cow Louse, do.
6. Pig Louse, do.
7. Ox Warble Fly.
8. Ox Warble Maggot.
9. Ox Warble Chrysalis.
10. Section of Skin.
 - a. Duct of Sweat Gland.
 - b. Sweat Gland.
 - c. Hair Follicle.
 - d. Hair Bulb.
 - e. Sebaceous or Oil Gland.

ELEVENTH LECTURE.

THE SKIN.

THE skin is a dense, porous, and very sensitive structure, serving to cover and protect the body from external injury. It is composed of three layers :—

1st.—**External, Cuticle, or Epidermis.**

2nd.—**Middle, or Rete Mucosum.**

3rd.—**Internal, Dermis, True Skin, or Cutis Vera.**

The **Cuticle** is composed principally of scales, which are cast off when done with, like the scales from the body of a fish. It is non-sensitive.

The **Rete Mucosum** lies immediately beneath the outer layer, and it is to this membrane that the skin owes its colour.

The **Cutis Vera**, dermis, or true skin, contains the **sebaceous**, fat, or oil glands, the **sudorific** or sweat glands, the hair, hair follicles, and bulbs.

The skin varies in thickness in different parts of the body. It is fine and soft where much motion is required, and dense and thick where the parts are exposed to the friction of work—as the back, shoulders, &c.

The **sebaceous glands** secrete an oil which pours into the hair follicles, for the purpose of lubricating, and keeping the skin and the hair soft.

Sudoriferous or Sweat Glands.—It is said that there are about 2,000 pores in one square inch of skin, for the purpose of perspiration, which is both insensible and sensible. The quantity of sweat varies very much, according to the season, condition of the animal, the work it does, &c. About 14 pounds of insensible perspiration are supposed to pass off every twenty-four hours from a horse, *i.e.*, above half-a-pound every hour, showing that the skin is an extensive draining organ.

The water excreted by the sweat glands exercises a protective influence over the external surface of the body, and tends to equalise the temperature of the system.

Cleanliness promotes the secretions of the glands of the skin, as is readily observed in the sleek coats of well-kept animals, such as **hunters, race-horses, army horses, &c.**

Hair.—In the lower animals, the body is covered with hair, or wool; this differs very much in texture, according to the climate, season, and the breed of animal; it also varies in this respect on different parts of the body. A hair is said to have a point, shaft, and root; the latter swells out into a bulb, and is fixed in the **hair follicle**,—a depression in the true skin.

The horse casts its coat twice a year, having a summer and a winter covering.

Castration, when the coat is being shed or cast, in some cases, tends to make the coat rough.

Clipping in Winter.—In late autumn, or early winter, the coat of the horse becomes very long and rough. Anyone who has driven a horse in this state, must recognise the oppressive effect the long close coat has on the animal, which begins to puff and blow, needing frequent applications of the whip, while perspiration oozes out of every pore. A horse stabled in this condition takes hours to dry, and in many cases, when put in thus at night, it will be found in the morning still wet and cold. This necessarily chills the surface of the body, tending to drive the blood from the skin, and to produce congestion of the internal organs, swollen legs, &c.

Clipping makes a wonderful change—the horse becomes an entirely different animal, active on its legs, and eager in its movements; the oppression has gone, the whip is no longer needed, and any little perspiration which may arise is quickly evaporated. The greatest advantage of all, however, is that the coat being off, the animal is more easily dressed and cleaned; the surface capillaries are thus stimulated in their circulation, animal heat sustained, and the internal organs kept free from congestive disorders.

From this, it will be seen that clipping acts as a splendid tonic, fully equal—in fact, superior—to an extra feed of corn per day.

Hoofs, horns, and claws are appendages pertaining to the skin.

The **hoof**, or **horny box**, protects and shields the sensitive parts of the foot, and is secreted by the coronary band (*see page 49*).

Horns, seen on the sides of the forehead of many animals, are modifications of the skin; they differ very much in shape, size, and colour. A horn has a base, body, and point, and is secreted by a fine vascular membrane, which covers the **horn core**, and forms a circular pad in connection with the skin at the base.

The rings formed at the base of the cow's horn are looked upon by many as an indication of the age of the animal; the first ring is supposed to make its appearance about the age of three years, a new ring being formed each succeeding year. These rings are often rasped out, and rubbed down with sand-paper and oil, to give the animal a more youthful appearance.

The bony projection, or **horn core**, is made up internally of cavities, interspersed with thin beams of bone, which give to it both strength and lightness.

Skin Diseases are numerous, and of great variety, and may be classed under three heads:—

- 1.—Inflammatory.
- 2.—Non-inflammatory.
- 3.—Parasitic.



INFLAMMATORY DISEASES OF THE SKIN.

Variola-Equina, or **Horse-Pox**, is a specific, vesicular, eruptive, febrile disease of the inflammatory type, happily of rare occurrence in country practice.

SYMPTOMS.—The horse hangs its head in a listless manner, and is off its food, while the skin is hot and dry. In the course of a few days, small vesicles are noticed cropping up on various parts of the body; each of these contains a thin fluid, and soon bursts forming a scab, which in time drops off, leaving a bare spot.

The fever has to be combated with gentle saline medicines, but purgatives must be strictly avoided. Doses of from one to two ounces of Epsom salts and one ounce of cream of tartar, given in hay tea, night and morning, are all the treatment that is required. When the skin is very itchy, sponging it frequently with sanitas and water, equal parts of each, has a very soothing and cooling effect.

The cow is affected by a somewhat similar malady, termed

Variola-Vaccinæ, or **Cow-Pox**, which, however, is now very rare. It was in the lymph contained in the pustules, or vesicles of this disease, that the immortal JENNER recognized the properties of a protective agent against human **smallpox**, and from this lymph he prepared his vaccine. The vesicles are usually found on the udder of the cow, and accompanying them there is, as in the horse, a considerable amount of fever and constitutional disturbance. Simple alkaline medicine, good nursing, and easily digestible food, constitute all the necessary treatment.

Variola-Ovinæ, or **Sheep-Pox**.—A vesicular complaint, somewhat analogous in its symptoms to the pox of the horse and cow, also affects the sheep, but is happily very rare. Here, the eruptions are first seen on the inside of the thighs and fore-arms. The affected animals should at once be removed, and isolated. Sheep-pox is under the Contagious Diseases (Animals) Act.

Simple Eczema, is an inflammatory eruption of the skin, which often affects the horse, in the spring and summer months when at

grass; it is characterized by the formation all over the body of minute vesicles or bladders full of a thin fluid; accompanied by itching and irritation, which causes the animal to rub itself against anything it comes in contact with. It is common in horses imported from other countries, and somewhat resembles mange, but in this case, there is no parasite present. Being very contagious and inoculative to other animals, all harness, clothing, saddles, brushes &c., used on an affected animal must be carefully washed in some disinfectant fluid. Although the complaint is distinctly inflammatory, there is seldom any accompanying constitutional disturbance, and the first thing to be noticed is that the hair stands up on end in minute patches, which, on closer examination, are found to denote the presence of small pustules, containing fluid. These soon dry up, forming a scab, which, if brushed off, leaves a bare place.

If taken in time, washing the body with Little's phenyle, one part to eighty parts of cold soft water, every three or four days, and giving tablespoonful doses of bi-carbonate of soda, every night and morning, in a mash, have a very good effect. Chronic cases, however, have to be dealt with by stronger treatment, such as arsenical preparations internally, with iodine applications externally.

Mallenders may be regarded as a sub-acute, or chronic inflammation of the skin at the back of the knee-joint, with a thin, irritative, watery discharge, causing the hair to stick out, and eventually fall off, leaving a thickening of the skin. It is a complaint common in cart-horses, notably those that have thick gummy legs, especially when out of condition.

TREATMENT is not always satisfactory. The general condition of the animal must have attention, the diet changed, and a mild laxative ball given (say 3 drachms each of aloes and bi-carbonate of soda), following up with tonic diuretic medicines, and dressing of the parts, twice a week, with a little 10 per cent. oleate of mercury, which should be well rubbed in. Of all the remedies I have tried, this application seems to have the best effect. On no account should the affected parts be washed, as this seems only to encourage the spread of the disease.

Sallenders is a complaint identical with *mallenders*; the only difference is in the situation, this being found at the front and bend of the hock. Treatment for this is the same as that laid down for mallenders.

Grease.—Strange to say, nearly all cases of sudden lameness and swollen legs, in this part of the country, are designated as “shots of grease,” whereas, in reality no such thing exists, grease being inflammation of the true skin, affecting the oil glands. Cart-horses of the round gummy-legged class are more subject to it than those of the light-legged class, while the hind-legs are more often attacked than the fore. The causes are various; some horses have a natural pre-disposition to it, and then anything irritating the lower part of the limb induces the disease. Sudden chills after the animal has been heated; washing and not drying the legs; want of exercise, with too stimulating food; feeding on new hay or oats; standing in filthy boxes, &c., have all a tendency to produce this complaint.

SYMPTOMS.—The first usually noticed are swelling of the legs, and stiffness on moving, but there is not that acute pain present which is characteristic of “weed”—often misnamed “grease” (*see page 144*). In a short time the hair stands on end, and a thin, yellow, oily discharge is seen oozing through the skin, which runs down the limb, irritating the parts with which it comes in contact. The leg is very painful to the touch, and in the hollow of the heel, and back of the fetlock cracks are seen in the skin.

TREATMENT.—The alkaline laxative ball, mentioned under mallenders, should be given, followed up with saline and iron tonics. The leg should be washed with Little’s phenyle (1 part to 80 parts cold water), a hay bandage rolled round the limb, and the phenyle water poured down it five or six times a day; this should be continued for thirty-six or forty hours. The after-treatment entirely depends on the progress of the case.

Grapes.—Grease often ends in the formation of troublesome, filthy-looking outgrowths round the pastern joint, resembling a bunch of red grapes, from which there is a nasty fœtid discharge. In such cases, the phenyle wash should be made stronger (say 1 in 40), and

when the parts are dry they should be dressed with powdered alum or blue vitriol. Burning off, with a hot iron, is sometimes necessary.

Mud Fever is a superficial, patchy, inflammatory eruption of the skin, affecting more particularly the legs of clipped horses. It is most common in winter-time, when the weather is very changeable *e.g.*, hard frosts being suddenly followed by thaws and sloppy weather, and *vice-versa*.

It is due to the wet mud being allowed to dry on the skin, and then washing it off on coming into the stable at night, without drying the legs afterwards. Washing seems to irritate the parts, and it is much better to allow the mud to dry on, and then clean it off gently with a soft wisp of meadow hay.

SYMPTOMS.—The first thing to be noticed is swelling of the legs, the animal appears stiff, and is not inclined to move, the hair sticks up in patches, and in the course of a few days, comes off very readily when rubbed. The legs usually suffer most, but cases occur in which the whole body is more or less affected.

TREATMENT.—When any constitutional fever is present, put the animal into a good, roomy loose box, and clothe it well up; the legs, however, must not be bandaged, but kept perfectly dry. The aloes and soda ball, as recommended (*page 219*), may be given with great advantage, followed up with suitable alkaline alterative medicine. Should the legs be very much swollen and painful, they may be bathed for about thirty minutes with hot water, then immediately dressed with the following lotion:—Sugar of lead, $\frac{1}{2}$ ounce, Fuller's-earth, 2 ounces, add water up to 1 quart; to be applied with a piece of sponge. Well-boiled barley and bran mash form the best diet.

Oils, and greasy dressings, are to be strictly avoided, but if the heels are very much cracked, a little vaseline may be applied. As a preventive, the legs of carriage-horses and hunters should never be clipped.

Cracked Heels consist of inflammation of the sebaceous or oil glands in the hollow of the heels, particularly those of the hind legs. The cause may be want of condition, through feeding the animal

on unseasoned hay or corn; washing and not drying the legs thoroughly; clipping the hair out of the hollow of the heels; and standing in filthy stalls, or boxes. Horses with white legs suffer most, possibly from the extra washing that they require.

SYMPTOMS.—The animal is seen to go stiff and sore on first leaving the stable; it may even click up the affected leg like a horse in string-halt, and go on the toe for a step or two, but generally improves in action after going a short distance. The pastern joint is found to be swollen and painful, and there is soon a breaking out in the hollow of the heel, with a bloody discharge.

TREATMENT.—Should there be much pain and fever present, then the soda and aloes ball (*see page 219*) should be given, and a poultice applied to the affected heel. This latter can be most effectually accomplished, by pulling a piece of the leg of a pair of old trousers over the foot, securing it round the top of the hoof by means of a strap, then filling in the hollow of the heel with bran and linseed meal, mixed with cold water to the consistence of porridge, and fastening the bag above the pastern joint, with a bandage over all. After the inflammation is reduced, the following lotion should be applied night and morning, viz.: sugar of lead, and sulphate of zinc, of each 2 drachms, cold water $1\frac{1}{2}$ pints—mix.

In chronic cases of cracked heels, when there is little or no swelling present, dressing them with carbolized zinc ointment usually sets things right in a short time; they should never be washed, or rubbed with a cloth; any mud on them should be left until it dries, then gently rubbed off with a wisp of meadow hay. If neglected, cracked heels may ultimately terminate in troublesome “grapey” heels, or “grapes” (*see page 220*).

Mechanical Injuries to the Skin, such as chafing of the shoulder and back from badly-fitting collars, or saddles, produce respectively, **sore shoulders** and **saddle-galls**. These must have immediate attention; their causes removed, and the sores bathed with clean cold water, night and morning, and then well covered with Fuller’s-earth. Should the skin be much damaged, dressing with the zinc and lead lotion will have a good effect.

Scratches and Pricks from thorns and barbed wire, are very common. When present, the thorns must be carefully removed, great care being taken not to break them in under the skin, as they very frequently cause a great deal of fever and pain, more particularly in the neighbourhood of a joint (*see page 39*). Dressing the parts with the zinc and lead lotion is all that is required.

Burns and Scalds may be very slight or very severe; in many cases they cause death, from the extreme exhaustive nerve-irritation, or **shock**. The great point to be observed in the treatment, is to exclude all air from the affected surface with any suitable medium which is at hand. For this purpose, nothing is handier, nor better, than a thick coating of treacle, over which a quantity of cotton wool, tow, or sheep's wool, should be placed, and secured with bandages. If treacle is not available, a pailful of good thick clay and water may be mixed and applied over the damaged surface with a whitewash brush, repeating the application when necessary; this when dried on, gives a great protection from the air. Any febrile symptoms which may arise, must be treated by means of cooling and soothing medicines, but on no account must purgatives be used. Should the bowels be irregular, small doses (say 5 to 8 ounces) of linseed oil, repeated every eight or ten hours will be found to be very serviceable. Food of a light and digestible nature ought to be given. When the fever and acute symptoms abate, the raw surfaces of the wounds should be dressed with the zinc and lead lotion.

Two very severe cases in the horse have occurred in my practice, both of which seemed to go on well for fifteen or twenty days, when unfavourable symptoms suddenly set in, and the animals died. In both cases, *post-mortem* revealed ulceration of the stomach at the pyloric opening into the intestines.



NON-INFLAMMATORY DISEASES OF THE SKIN.

Warts, Wens, or Angle-Berries are of a non-inflammatory character, and are abnormal growths, or enlargements, of the scales of the outer layer of the skin, to which some breeds of animals are predisposed. They usually occur on the soft thin parts of the skin, such as the nose, sheath, thighs, &c.; sometimes with well-defined, or broad thick necks deep through the skin, or even encased in a sheath, just like the kernel of a nut in the shell. In many cases they become very troublesome, on account of their persistence, growing again with great rapidity after it is thought that they have been successfully removed. Pulling or twisting them off quickly with the fingers usually answers best; at other times, a pair of strong scissors, knife, ecraseur, or hot iron may be used in their removal. A dressing of green tar should be applied to the bare surfaces the day subsequent to the removal of the warts.

Warts and tumours are often found on the penis of the horse and bull. These are extremely troublesome, and when large interfere with the act of urinating, and in the bull especially, with that of serving, after which, bleeding often occurs.

TREATMENT.—In the horse, the penis must be drawn and washed with some antiseptic, nothing being better than phenyle in the proportion of 1 to 80 of water, then the offending growths are removed with the knife or scissors, and the wounds dressed with tincture of iron. It may be necessary to cast the animal before operating. In the bull, the penis is bad to draw even when the animal is cast. My method of procedure is to allow the bull to raise itself on to a cow's back, when with a loop in a piece of broad tape held in my left hand, the penis is seized and retained until the warty excrescences have been clipped off, and the parts dressed with tincture of iron.

These growths occasionally involve the substance of the organ, and then **amputation** has to be resorted to.

The cow also suffers very much from these excrescences, and as they materially affect the health and thriving of the animal, they should be immediately removed.

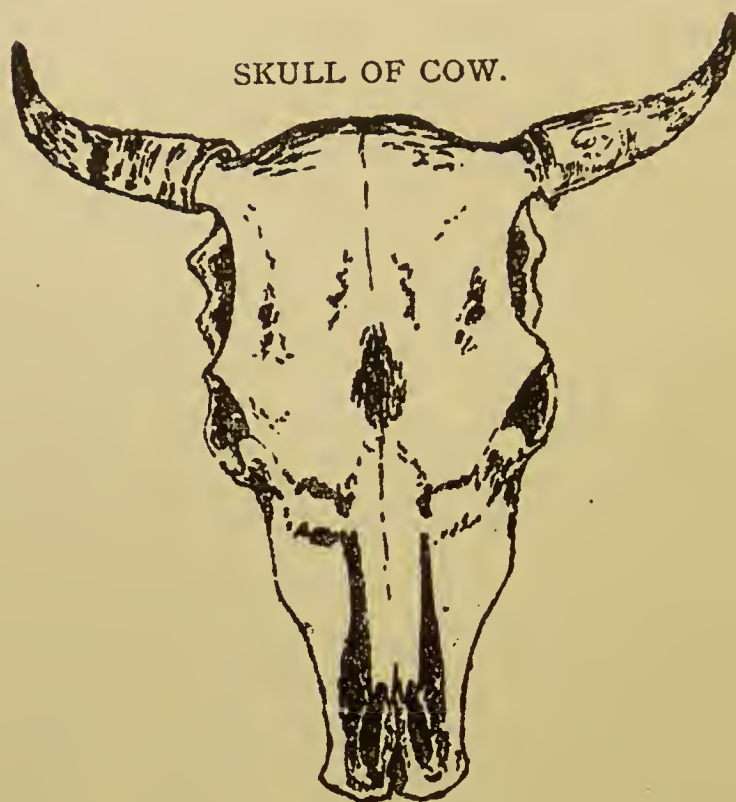
PLATE XXXIII.

(Original—SCOTT.

SECTION OF THE FOREHEAD, AND ONE HORN OF THE COW.



SKULL OF COW.



SECTIONS OF HORN.

Horn Overgrowths and Injuries.—The horns sometimes turn and curve in so much, that the overgrown points press tightly on the forehead, giving the animal so much pain that it ceases to feed and thrive. These must be attended to, and if necessary removed with a saw. Again, the horns sometimes stand out with very sharp ends, in which case the points have to be cut off with the saw, or protected with wooden balls, to prevent goring and wounding of other animals. When the horns are very large, it is found necessary to remove them by an operation termed “**dishorning;**” this to many is very objectionable, and looked upon as cruel, but it is not more cruel than to leave them on, and thus enable the larger animals to attack and wound their lesser and weaker companions. As the horn is non-sensitive, and the **horn core** nearly so, as well as being hollow, there is very little pain accompanying the operation.

Occasionally a cow may become fixed by the horn, and in endeavouring to liberate itself, the horn may be stripped off, without injuring the horn core; when this happens, the parts must be dressed with carbolic oil and tow or cotton wool, and above this a layer of tar and tow, securing all with a light bandage fastened to the other horn. When the horn and horn core are fractured, the rough projections and broken fragments of bone must be removed, and sawn level, the bleeding stopped with a hot iron, and dressed as above.

Abscesses are at times met with in the cavities of the horn, arising from an injury done to the parts, and causing extreme constitutional disturbance; the animal breathes quickly and pants, the eyes are injected, perspiration rolls off the body, and the pulse is full and bounding.

The most noticeable symptom is, that the animal holds the head low, and to one side, giving it an occasional shake; if pressure be put on the root of the horn, the animal may bellow out, and fall over on to its side, as if in a fit, rolling its eyes, and breathing in a heavy and spasmodic manner.

TREATMENT.—Bore into the base of the horn with a small trephine or a $\frac{1}{2}$ -inch gimlet, and after the pus has been liberated, roll cold water bandages round the horn, keep them constantly moist, and administer a good dose of purgative medicine.

PARASITIC DISEASES OF THE SKIN.

Mange or **Scab** affects the horse, cow, sheep, dog, cat, &c., and also the human being. This troublesome disease is due to the presence of small parasites developed from eggs, which are deposited in vast numbers, on, or in the skin.

These are of three different families, viz :—

- 1st.—**Symbiotes**—the parasites that live on the skin.
- 2nd.—**Dermatodectes**—those boring into the skin.
- 3rd.—**Sarcoptes**—those burrowing through the skin.

These differ in size and form in the various animals—as may be seen by the diagrams—and they also differ in a like respect, according to the situation they occupy on the skin of the various animals. Thus, mange must be considered under the three heads:—(1) *Superficial*, (2) *Middle*, (3) *Deep-seated*. From this fact it may be easily understood how some attacks of mange readily yield to treatment, whilst others verge on the incurable. It therefore is necessary to ascertain what class of mange has to be dealt with, before suitable treatment can be adopted. Mange usually attacks the horse in the region of the mane, head, and tail, causing much irritation, and discomfort to the animal, which need be no matter for surprise, when the hook-like appendages on each parasite are considered.

SYMPTOMS.—The animal appears dull, and is much inclined to rub the affected parts, whenever it has the chance. Rubbing the fingers gently over the irritated places causes it to move the lips and muzzle with an expression of great pleasure. Close examination shows a number of small pustules containing a small quantity of serous fluid, which soon escapes, forming a scab or crust.

TREATMENT.—All animals so afflicted should be carefully isolated, since—as will be quite obvious to all, from its parasitic nature—the disease is a highly contagious one.

The animal must be carefully washed with some parasiticide. Any of the non-poisonous dips may be used, but dip containing arsenic must not, on any account, be used where the skin is at all

excoriated or broken. Little's phenyle—1 part to 30 or 40 parts of cold water—has a very good effect, and, in bad cases, dressing with whale oil, black sulphur, and spirits of tar, mixed, may be attended with good results. Iodine preparations are very useful, but nearly every practitioner has his own favourite remedy. The stables, boxes, clothing, harness, &c., used by the infected animals must be carefully washed and constantly disinfected.

FOR THE DOG.—I think nothing is better than the application of a mild preparation of the green iodide of mercury—say 30 grains to 1 ounce lard or vaseline. A simple wash can be made by boiling a quantity of foxglove leaves (*digitalis*); when cold, apply to the parts.

Should any constitutional disturbance be present, it must be attended to, and the bedding, which ought to be of pitch pine shavings, or sawdust, changed every three or four days. Carbolic acid, strong mercurial ointments, or tobacco wash, should never be used on the dog, as these have a dangerously depressing, and sickening effect.

Warbles.—These are small elevations or tumours, about the size of a lady's thimble, found on the back of the cow, between the shoulders and the loins, varying in number up to 50 or more, and causing great loss, not only in the value of the hides, but to the flesh immediately beneath as well. The tumours contain larvæ, developed from the eggs deposited there by the ovipositor of the female **Bot Fly**, or **Ox Warble Fly**, in the months of July and August, and make their appearance about the following January, February, or March, or perhaps later.

The Ox Warble Fly.—According to Miss A. E. Ormerod,—

"This fly is two-winged, and upwards of half an inch in length, and is so marked that it resembles the humble bee; with a yellowish face, body between the wings, yellowish in front, and black behind; abdomen whitish at the base, black at the middle, and orange at the tip; large head and brown wings, black legs and lighter feet."

The female fly has a long telescopic egg-laying tube for burrowing into the back of the animal, which, on being attacked, shews great excitement, rushing wildly about the pastures with its tail extended,

TWELFTH LECTURE.

THE URINARY SYSTEM.—A.

THIS consists of the **Kidneys, Ureters, Bladder, and Urethra**, and by these organs the urine is extracted from the blood, and expelled from the body.

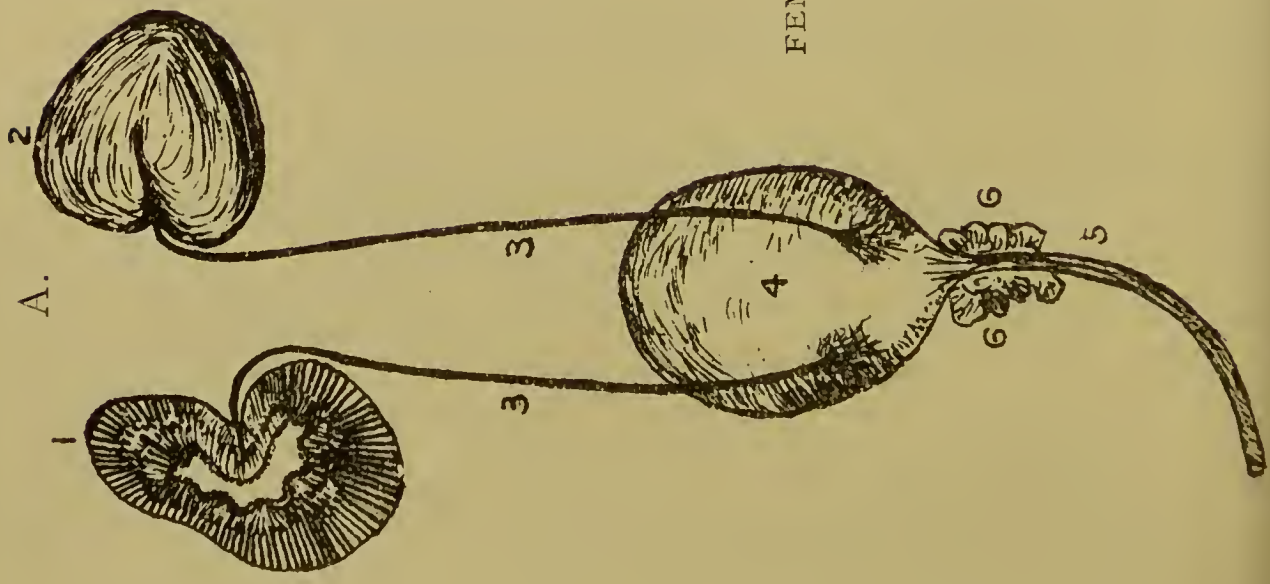
The **Kidneys** are reddish brown, glandular bodies, situated in the under part of the loins,—one on each side of the back-bone. They are supported and held in position, by their vessels aided by a quantity of fat—the suet—in which they are embedded.

The right one lies a little further forward than the left, being found behind the heads of the last pair of ribs. There is a marked difference between the shape of the kidneys in the horse and cow. In the former, they are shaped like the heart on playing cards, whilst in the latter they are more ovoid, and distinctly lobulated.

Structure of the Kidney.—The organ is made up of tubes (*uriniferous tubes*), blood vessels, nerves, and connective tissue; the whole being invested by a fibrous capsule.

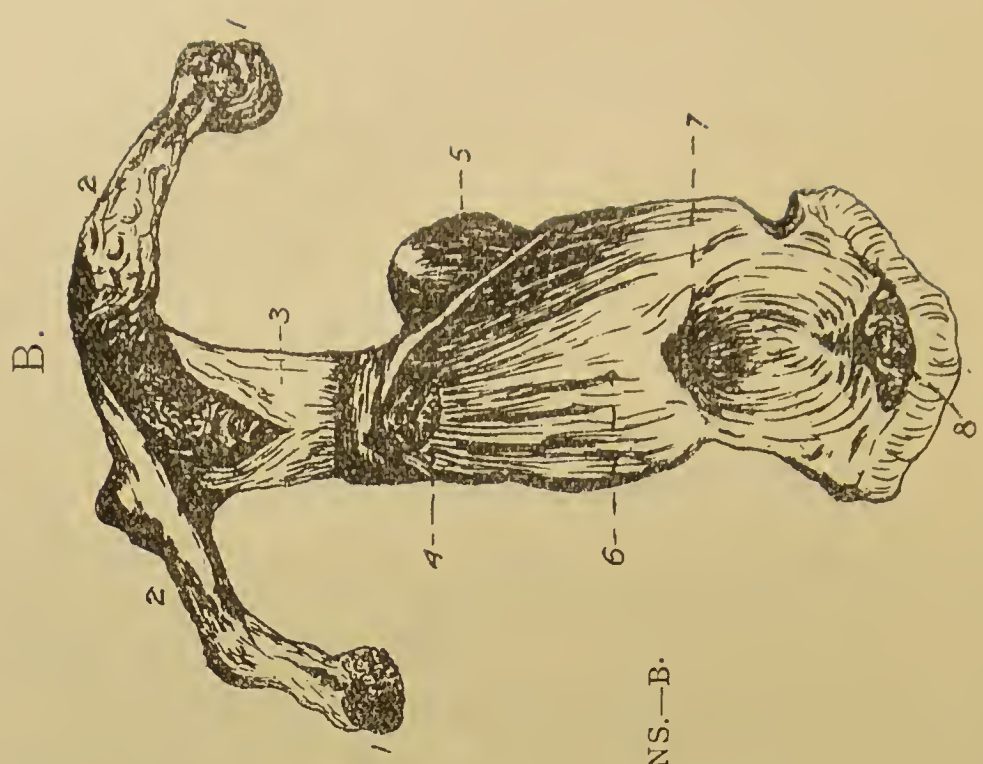
On making a horizontal section of the kidney, it is found to consist of two distinct substances separated by a boundary line, which is dark in colour and known as the *limiting layer*. These are known as the **external or cortical**, and the **internal or medullary layer**.

The Cortical Substance.—On examination, a vast number of little red spots are seen, called the *Malpighian bodies*; each of which consists of a tuft of capillary blood-vessels, (given off from the *renal artery*), enclosed in a membranous capsule, known as the *Capsule of Bowman*.



URINARY APPARATUS—MALE.—A.

1. Left Kidney cut across.
2. Right Kidney.
3. 3. Ureters.
4. The Bladder.
5. Urethra.
6. 6. Prostrate Gland.



FEMALE URINARY AND GENERATIVE ORGANS.—B.

1. 1. Ovaries.
2. 2. Fallopian Tubes.
3. Uterus or Womb.
4. Os-Uteri, or Neck of Womb.
5. Bladder.
6. Vagina, or Passage, laid open.
7. Meatus Urinarius—Neck of Bladder.
8. Clitoris at External Opening.

The **Medullary Portion** is paler in colour than the cortical, and on the whole is more dense in its structure. It consists of cone-shaped masses, the points of which are directed towards the centre of the gland, where is found an irregularly shaped cavity, known as the *pelvis* or *basin*. These cone-shaped bodies are, in reality, the bundles of uriniferous tubes.

Briefly then, the urine is secreted by the Malpighian bodies, and certain portions of the uriniferous tubes, from pure arterial blood, supplied by the renal artery; it passes through these uriniferous tubes into the basin of the kidney, thence into the ureters, which convey it to the bladder.

Supra-Renal Capsules.—These are two little glandular bodies, attached to the front borders of the kidneys; they are ductless, and their use is not well known.

The **Ureters** are two tubes running from the basin of each kidney to the bladder, and as before stated, their function is to carry the urine from the kidneys to the bladder. They enter the bladder obliquely at the upper and back part, and in so doing form a sharp bend, which acts as a valve, particularly when the bladder is distended. A small papilla at the entrance of each, permits the urine to flow in, but not to return to the ureter.

The **Bladder** is a musculo-membranous sac or bag, found in the pelvic cavity. Its function is to receive and retain the urine until a sufficient quantity has been collected for expulsion. In this way, a constant dribble of fluid is avoided.

Structurally, it is made up of three coats, and consists of a *fundus*, *body*, and *neck*; it is held in position by means of ligaments.

The bladder, when distended with urine, is pear-shaped, and extends into the abdominal cavity. On the fundus a scar or cicatrix is seen, which is all that remains of the *urachus*, the tube by which the urine is carried, by way of the umbilical cord, to the placenta during foetal life. The neck passes backwards, and terminates in

The **Urethra**, a tube which, in the male acts as an excretory duct, for both the urinary and generative systems, and is contained

within the penis. In the female, however, it has only one use, and that is for the passage of urine.

Urine.—This is a fluid which may be either acid or alkaline in its re-action, according to the class of animal from which it is excreted. In herbivorous animals it is alkaline, and of a rather muddy appearance. The horse excretes, on an average, about 8 to 10 pints of urine per day, but the quantity and quality can be greatly altered by various conditions. These are chiefly, variation in food and work, housing, the drinking of large quantities of water, and the action of certain drugs and medicinal agents such as nitre, resin, turpentine, juniper, cantharides, and the various balsams.



DISEASES OF THE URINARY AND GENERATIVE ORGANS.

Nephritis—Inflammation of the Kidneys.—This occurs in three forms, viz.:—acute, sub-acute, and chronic; most often in the two last named forms, though it is a rather uncommon disease in the domestic animals.

SYMPTOMS.—At the onset of the acute form in the horse, the symptoms very much resemble those of colic, or inflammation of the bowels, only the pain is not nearly so violent; the animal frequently lies down and gets up again, perspires freely, and breathes hurriedly; there is a quick pulse, and a great rise of temperature; when lying, the patient attempts to put its nose on to its loins, while if standing, it constantly stretches into a position to urinate, and small quantities of urine, very highly coloured and occasionally tinged with blood are passed. The urine, if collected in a vessel, and allowed to stand for a time, will coagulate.

In the sub-acute and chronic stages very little pain is manifested, the animal is very dull, has a tucked-up belly, a staring coat, hurried panting breathing, a quick small pulse, and a high temperature of from 105° to 106° .

If the case is not early relieved, it terminates in *uremic poisoning* (see page 102), or in the formation of *abscesses* in one or both kidneys. When only one kidney is affected, the other does the work of both, and becomes **hypertrophied** or enlarged. During the time the sound kidney is comportsing itself to the double duty, all the symptoms of uremic poisoning are manifested. After a time, the abscess may become encysted, and the animal appears to get well, doing its work with only one kidney. Again, the abscess may burst, and its contents pass along to the bladder in the urine; there the solid portions of the pus or matter may coagulate, and passing into the urethra, block up the passage, so that the case may end in rupture of the bladder, from the continual attempt to void the urine.

The causes are various. Some writers hold that the too frequent administration of fancy condition balls and powders, containing potash, balsams, turpentine, resins, &c., is a cause, but if this were so, the complaint would be of more frequent occurrence. Bad food, of a mouldy and heated nature, and too severe blisters containing cantharides and turpentine may be blamed. My own opinion is that sudden chills, exposure to inclement weather,—for instance, an animal being caught by a flood, and compelled to stand for hours, nearly up to the belly in water,—or falling into and remaining for some time in a quick mire, or deep gutter, where the water rises up over the back and loins, are often the cause. Cases arising from these latter causes, generally prove fatal in from 15 to 24 hours.

TREATMENT.—As the complaint is not readily diagnosed, great care should be taken not to administer quack medicines of a turpentine or balsamic character; for although they may answer in spasmodic colic, they are extremely dangerous in cases of kidney affections. From 15 to 25 ounces of linseed oil, with 2 to 4 ounces of laudanum should be given at once, and to relieve the kidneys of some of their work, the skin should be excited by a large hot poultice, made of maize or oat-meal, put into a flannel bag and laid over the loins; or by a blanket, six or eight ply thick, wrung out of hot water and laid over the back with dry woollen rugs on the top, and a waterproof covering over the whole, whilst a good mustard poultice over the loins may also prove beneficial. A newly-flayed sheep-skin may be tried; warm water injections given every four or six hours, and the legs well bandaged; hypodermic injections of *pilocarpine* and *physostigmine* are also very useful. Fly blisters must not be used on any account, as the cantharides and turpentine which enter into their composition, act strongly on the kidneys, nor should aloes balls be given for the same reason.

When the active symptoms have been relieved, easily digested food of a simple character should be offered, such as, linseed jelly and milk, or milk and water, and well-boiled barley and bran.

Hypertrophy, or enlargement of one or both kidneys, is sometimes met with on making *post-mortem* examinations, no indications of such having been observed during life. Some cases are recorded

where the kidney has weighed from 50 to 112 lbs. When one kidney is abnormally enlarged, the other is generally **atrophied**, or much smaller than it should be ; enlarged kidneys are, as a rule, very soft and flabby.

Calculi or Stones are also sometimes found in the basin of the kidneys on making dissections after death.

Melanotic Tumours are occasionally met with, more particularly in the kidneys of grey horses.

Hæmorrhage sometimes occurs, when a quantity of clotted blood is passed with the urine ; but this may result from injury or disease of any part of the urinary system.

The **SYMPTOMS** of the foregoing diseases of the urinary organs are not well pronounced, and the cases have to be diagnosed from negative points.

Polyuria, Diuresis, Diabetes Insipidus, Profuse Staling.—(Considered a dietetic disease)—In the horse, this complaint is characterized by the passing of enormous quantities of urine ; in one case as much as thirty-eight gallons is recorded to have been passed in five hours. Horses in towns suffer more from this malady than those in the country. The cause in many cases is due to bad food—such as mew-burnt hay, or kiln-dried oats, ship-damaged or mouldy corn and beans, or to drinking an excess of impure water ; it also follows debilitating diseases, such as influenza, strangles, &c.

SYMPTOMS.—The animal loses flesh very fast, is very dull and languid, has the belly tucked up, a staring coat, and great weakness, manifested by platting of the hind-legs. The patient has extensive thirst, and can scarcely be satisfied with water. (I have seen an affected horse go down on to its knees, and drink from a filthy gutter.) The appetite is very irregular. There is an almost continuous flow of urine ; in some cases, the penis hangs pendulous, and clear urine continually dribbles from it, and if not speedily relieved, the patient dies from exhaustion or inanition.

TREATMENT.—The animal must be taken off work ; enquire into the quality of the food, and if it be found faulty, change it at

once to a good sound nutritious diet; next, allay the thirst, and for this purpose nothing has such a radical effect as one drachm doses of iodine, given every night in a ball; and for a tonic, 25 to 30 drops of strong hydrochloric acid, every morning mixed with the drinking water.

When an apprentice, I remember horsekeepers and farmers giving clay-water to their horses to drink, when suffering from this complaint, and on enquiring why was told "that the clay stopped up the little holes in the kidneys, and prevented the urine filtering through!"

Suppression of Urine.—This takes place when, from some cause or other, the urine is not secreted by the kidneys. It may arise from **fever**, an **inflammatory attack**, or **functional derangement of the kidneys**.

SYMPTOMS.—The animal is very dull, and makes frequent attempts to stale, but only succeeds in passing very small quantities of urine; on examination, per rectum, the bladder is found to be empty.

Before any treatment is adopted, it is necessary that the real cause be ascertained. If it arises from inflammation of the kidneys, strong diuretics are dangerous, whereas, if from sluggish action of those organs diuretics may be given.

Retention of Urine.—This is the reverse of *suppression*, as in this case the urine is properly secreted by the kidneys, and passed along the ureters to the bladder in the natural way, but is not ejected.

There are many causes of this condition, of which the following are the chief:—Extreme muscular contraction, or spasm of the neck of the bladder—**strangury**, which may be due to the application of a fly blister to any part of the body; **paralysis** of the muscles of the bladder; **enlargement of the glands**, near the neck of the bladder; the presence of **calculi** in the bladder, or in the urethral passage, or from the coagulation of the solid portions of pus discharged from **an abscess** in the kidneys, or bladder (*see page 233*);

examples of the three last-named have come under my own observation. Again, another great cause of retention is the habit which a horse acquires of refusing to stale except in a box, or stall, with straw under it. On coming in from a long journey, the urine has been retained such a length of time that even when anxious to urinate, only small jets of the fluid are passed. In these cases, the neck of the bladder becomes inverted, and the body of that organ overlaps and presses on the inverted portion, thus preventing a free flow.

SYMPTOMS.—The animal is very uneasy, groans, has colicky pains, draws the penis, and makes frequent attempts to stale. The hind legs are stretched backwards, and held wide apart, while the tail is rolled about in various directions, and perspiration bedews the body.

TREATMENT.—The hand and arm should be well oiled or soaped, and carefully introduced into the rectum, and the dung removed, after which the bladder will be found as a distended bag underneath the hand. By the aid of gentle pressure with the hand, and warm-water injections thrown into the rectum, the animal may then urinate; if not, the urine must be removed by the catheter at once.

Cystitis or Inflammation of the Bladder is seldom seen either in the horse, cow, or sheep, except after cases of difficult parturition. The most prominent symptoms are, that the animal continually passes small quantities of urine, and has colicky pains.

TREATMENT.—Externally—Hot applications to the loins according to the rules laid down for inflammation of the kidneys. Internally—Sedative medicine should be given: for the horse and cow, from 2 to 4 ounces of laudanum, with 15 to 25 ounces of linseed oil; for the sheep, 2 to 4 drachms of laudanum, in from 5 to 10 ounces of linseed oil; warm-water injections should be thrown into the rectum, while from 20 to 30 drops of *pure* carbolic acid, in 15 to 20 ounces of tepid water injected into the bladder has a beneficial effect.

Abscess in the Bladder sometimes occurs, in the cow, from injury done to that organ in difficult cases of calving, more particularly if there has been a breech presentation.

SYMPTOMS.—Continual paining and straining, with dribbling of urine. On examination, per rectum, a swelling is felt, and on further examination, per vaginam, it is found to be in the bladder. The neck of the bladder is very relaxed, so much so, that the fingers can be readily passed through it, and the abscess felt with the tips of the fingers of the left hand, aided by the right hand in the rectum.

The operation for the liberation of the pus is rather tedious: first, the catheter is passed into the bladder, to act as a director for the insertion of a canula; the catheter is now withdrawn, and a trocar introduced into the canula, which is pressed into the abscess; then the trocar is withdrawn, and the matter escapes per canula; pressing the abscess with the right hand in the rectum greatly helps the removal of the matter. The operation being completed, the bladder is washed out with tepid water and a small quantity of tincture of iron; constitutional disturbance, if any, must be combated with fever medicine, and if necessary, hot water blankets or porridge poultices can be applied to the loins (*see Inflammation of the kidney*).

Calculi or Stones are sometimes found in the bladder, urethra, and kidney; they may form in the kidneys and pass down the ureters into the bladder, or accumulate in the bladder itself; one or more stones may be found sticking in the neck of the bladder, or in the urethra, causing retention of the urine, and if not removed, probably rupture of the bladder. The horse and dog are most often affected with these troublesome concretions.

SYMPTOMS.—These are somewhat like those of retention of the urine. In some cases the animal may be urinating fully and freely, when all at once, the flow is arrested—the horse making frequent attempts to stale, groaning and straining, but only managing to pass a few drops. On examination, per rectum, calculi are at times found, crowding around, and in the neck of the bladder; by manipulation with the fingers in the rectum, they may be displaced, and the animal relieved.

A calculus sometimes gets into the urethra, where it sticks a few inches below the anus; it can be seen and felt at the point of stoppage, the parts above bulging out, while the urine trickles down

the thighs. With a little labour the stone may be worked back into the bladder, assisted by gently passing the catheter, or it may get so far down near the end of the penis, that it can be cut down upon and removed.

When calculi in the bladder of the horse give rise to pain and inconvenience, they have to be extracted by an operation called **lithotomy**. In this operation, the animal is cast and tied much in the same way as for castration; the passage is cut into below the anus, and with suitable instruments, the stones are removed, either whole or crushed.

Bulls, Rams, and Wethers, when too largely fed on mangold-wurzels, or turnips grown with superphosphate alone, suffer from accumulations of white crystals—the *ammonia-magnesia-phosphates*—in the bladder and urethral passage. When a bull is fed to an excess on mangolds, it invariably proves unfruitful; I think this is due to crystals, which have lodged in the barrel of the penis, being transmitted along with the semen at the time of service, interfering with fruitful conception. I have frequently gathered these concretions from the hairs surrounding the sheath of animals which have been fed on the above-named foods.

In the **ram**, the passage and *vermiform process* or worm, on the end of the penis is often entirely blocked. When thus affected, the animal suffers great pain, it strains and presses very much, the hind parts swell up, and the urine, if not liberated, gets into the body, producing uremic poisoning, causing death.

TREATMENT.—Cutting in at the base of the worm, or removing it entirely, sometimes gives relief; the latter I have done on many occasions, both in the ram and wether, which in no way affected the former as a stock-getter. When wethers folded on turnips suffer from this complaint, the best preventive is to place over the field branches of the common fir tree—the sheep will eat the bark off them readily, and by its action the formation of the crystals is avoided.

Catarrh, or Incontinence of Urine.—This may arise from a common cold, attacking and causing irritation of the lining

membrane of the urinary organs, or from loss of nervous energy in the bladder alone. Both conditions give rise to a continuous dribble of urine, which must be treated according to the cause.

Paralysis of the Bladder arises from want of nerve power in the organ. It may be the result of local or general paralysis, milk fever, injury, or over-distension with urine. In the last case, the muscles of the body of the bladder become so stretched that they lose their tone, and are unable to contract and assist in expelling the fluid in the usual way. Although the urine is constantly dribbling away, on examination, per rectum, the bladder is found to be full of water, which must be drawn off with the catheter. If simply due to loss of nerve power without complication, a tonic such as sulphate of iron, and nux-vomica, of each one drachm, should be given daily, along with a liberal and nutritious diet; should it, however, occur as the result of some other disease or injury, special treatment is required.

Orchitis, or Inflammation of the Testicle.—This occurs in the male species of all our domestic animals, but generally speaking, the ram is the greatest sufferer. It arises from some injury, such as a kick, and as a result the parts undergo inflammation, which is manifested by heat, pain, and swelling, the pain being very great if the animal is made to move; there is also a great amount of fever and constitutional disturbance present.

TREATMENT.—When the animal is in high condition, blood-letting has a decided and beneficial effect; an aperient (such as linseed or castor oil), and warm water enemas are required, followed up by nitrate of potash in the drinking water. The parts should be well fomented for an hour, then smeared over with the extract of belladonna, and covered up with cotton wool. The testicles ought then to be supported by a broad bandage secured round the loins, behind the legs, and over the quarters, and for this purpose, a long netted window curtain answers best.

These cases, if at all severe, may end in dropsy of the scrotum, termed **hydrocele**, which has to be relieved by tapping.

Injuries to the Penis.—These are due to many things, the chief of which are the following:—a kick, a blow with a whip

or stick, and a mishap while jumping a stone wall, stake or wire fence. At the seat of injury, there is much pain and swelling, accompanied by feverish symptoms generally. Sometimes the swelling is so great that the organ hangs loose and pendulous, and cannot be retracted again into the sheath ; this is called **paraphymosis**. When this condition is met with, scarification must be resorted to ; this is done by a lancet, the point of a clean penknife, or a darning needle being stabbed into the most prominent parts of the swelling. Follow up with fomentations for 40 or 60 minutes, and apply the suspensory bandage as recommended for inflammation of the testicles.

As a laxative, give a draught of from 15 to 20 ounces of linseed oil, or from 2 to 3 ounces of Epsom salts, and $\frac{1}{2}$ ounce of cream of tartar in a mash, night and morning.

In recent cases, this treatment soon sets all right, but in chronic cases, a tonic treatment has to be adopted. Swelling of the penis may arise from **protracted strangles**, **influenza**, and other debilitating diseases.

Excoriation of the Penis.—This is mostly seen in stallions, as a result of excessive service in hot weather, particularly when the grooms are not sufficiently careful to wash the parts well with cold water immediately after use. It may also arise both in the stallion and bull, from having communication with a female suffering from chronic inflammation and ulceration of the vagina (**vaginitis**), or from whites (**leucorrhœa**).

TREATMENT.—Take the animal off service, and wash the parts, and also the sheath, night and morning, with a mixture of 1 part phenyle and 80 parts water. Afterwards dress with the following:—Sulphate of zinc 2 drachms, sanitas fluid 5 ounces, cold water 1 pint.

Sebaceous Accumulations in the Fossa Navicularis at the end of glans-penis in the horse, causing lameness in one or both hind legs,—these are collections of solid clay-like matter in the cavity round the opening of the urethra, at the point of the penis. In two cases, in my practice, the animals could not pull their hind extremities forward, but stood with them stretched backwards, as if in the act of staling ; on washing the penis, and removing the hard

matter, they pulled themselves together as if nothing had been amiss. In three other cases, the horses had a peculiar lameness in one hind leg, without any apparent cause; on examining the parts, and removing the collected material from the penis, the lameness disappeared.

PREVENTION.—Wash the parts with warm water once every five or six months.

Castration.—This is one of the oldest operations on record. The main object of its performance is to render animals more docile, and easy to manage, and although it has a marked quietening effect in the horse, yet the stallion, when trained, worked, and fed in the same way as a gelding, generally does its work with equal ease and docility. Of all the animals subjected to the operation, the best results are seen in the bull—as witness the calm quiet appearance of the eye and head, and the easy comportment of a big three or four years old bullock, compared to the rugged forehead and the fierce eye of a bull of the same age. Although castration can be performed with ease and success, the operation, at the best, is not one of a pleasant nature; but when the safety of mankind is at stake, the end justifies the means.

The Horse.—At the present day, there is a great amount of controversy going on between those who favour operating on the colt in the standing posture, and those who cast and secure the animal. The use of chloroform is also being discussed, but generally speaking, every operator has his own particular method. An old-fashioned, yet I think the best way, is to cast and secure the colt; before operating wash the penis well with cold water and carbolic soap, dry with a clean rough towel, and pour into the sheath a little carbolic oil, smearing some of it over the bag (scrotum); then take hold of the testicle, and press it tight into the scrotum, and by one quick sweep of a sharp knife, make a bold opening, and expose the gland, which is seized and pulled gently up; the clam is put on about from $1\frac{1}{2}$ to 2 inches up the cord, and with the hot iron—dead red-heat is best—the non-vascular, or hinder portion, is quickly cut through, and liberated from the clam;

then the spermatic cord (or string) is *slowly* seared through, and when satisfied that the bleeding has stopped, by gently opening and shutting the clam, let the parts go, and treat the testicle of the other side in the same way. This mode of operating, with an ordinary colt, only takes from eight to twelve minutes to cast, tie, wash, castrate, and liberate, and owing to the success attending it, I am very partial to it. Many operators, qualified and unqualified, open the scrotum with the hot iron, and are very successful.

Another form of operation is to cast the animal, and remove the testicles with the **ecraseur**, or by **torsion instruments**. I have tried both, but do not like either, as, in some cases, bleeding followed.

Some operators lay open the scrotum with a knife, and fix on to the cord a clam made of two pieces of wood, for the purpose of stopping bleeding; this is one of the methods of operating in the standing position. There is no doubt that this is a most cruel proceeding, whether performed lying down or standing; to leave a pair of wooden clams dangling at the end of the cord for several hours, to be pulled up and down by the action of the muscles, into the raw open wound, must be highly painful and irritating to the unfortunate animal. The clam should only be used in cases of **hernia** (rupture), and should then be put on over the skin.

With reference to the standing operation, I think it fool-hardy on the part of the owner as well as the operator. Many things can be urged against it; one, for instance, when the **ecraseur** is about half-way through the cord, the animal suddenly lies down, and the operator, not wanting to be beat, sticks to the instrument and so drags the cord too far out; one case like this would satisfy me. As for injuring the animal in casting, the record of such cases is extremely small; I cannot remember a single case of mine, where any harm resulted from casting with the side-lines.

Crushing the testicle—(a cruel job) **scraping** the cord through, **tying** the cord with silk or antiseptic thread, and **tying** the blood-vessel alone, are all practised, but, as already stated, I prefer casting and the hot iron.

The **Rig**, is a horse, in which, one or both testicles have failed to come down into the scrotum. In ordinary castration, should one testicle only be down at twelve months end, I make it a rule to take it away so that the other may develop, and subsequently descend. With the exception of two cases, this has taken place, removal following in the ordinary way. Should this not happen, the best time to operate on a rig is when it is rising three years old. Several members of the profession have made a speciality of this operation, which they perform very successfully, but the great secret seems to be in the manner in which the animal is tied for the operation.

In the horse, the time selected for castrating is when the animal is rising one year old, in the spring months—April and May,—just before it is turned out to grass, but the operation can be performed at any age and at any time.

The **Bull**.—As a rule, the young calf, when five or six weeks old, is castrated by its owner, but, when asked to operate, I get an attendant to cast and hold the animal in a sitting position on its hind quarters, with a strap round both hind shanks, on which the foot is placed. The testicles are next pressed up tight, and with a quick sweep of the knife a good opening is made into the scrotum, first on one side, and then on the other, making both cuts into one at the end, get hold of the testicle, cut through the non-vascular portion, and either draw the cord, or pull it tight, and cut it quickly through.

When operating on the bull, from six to twelve months old, it is best to have it standing and held by an attendant by the nose, with the right side against a wall, door, or gate; the operator stands on the left, and behind the hind quarters, and grasps both testicles at once, then makes a clean cut with the knife, first on one side, then on the other, round the end of the scrotum; the non-vascular portion is severed, then the clamps are applied to the vascular cords of both testicles, about two or three inches above those organs, and both are slowly seared through at once with the hot iron.

The **Pig**.—An attendant holds it firmly by the hind legs with the back towards the operator; the testicle is pressed up behind, and close to the tail root, and cut down upon with a sharp knife; pull

up, and lay the cord over the sharp edge of the knife and cut quickly through.

The **Lamb**.—Shepherds are generally the best and most fortunate operators on this animal, cutting through the skin of the scrotum, with a knife, and drawing the testicle and cord out with their teeth.

The operation on an **Aged Ram** does best when the bag is divided with the hot iron, and the testicles are seared off with the same.

AFTER TREATMENT.—If the colt has been indoors before the operation, keep it in a box till the parts are healed. If out at grass, bring it in, and keep indoors until the day after the operation; after that if fine, let it out daily for a few hours. As a result of castration, swelling to a greater or lesser extent occurs; this drops down into the sheath, and if left alone for five or six days usually disappears. Should the sheath be very big and pendulous, stabbing with a small lancet, a darning needle, or the point of a *clean* penknife, allows the escape of the collected serum.

PRECAUTIONS.—Before operating, it is of the utmost importance to ascertain, that there is no cold, influenza, strangles, or the like amongst the animals on the farm, or even on the neighbouring farms. Furthermore, the operator must see that his hands and person are thoroughly clean and aseptic, as it is highly dangerous to operate after removing cleansings, making post-mortems and the like.

COMPLICATIONS.—There are many matters of a serious nature, that may arise after castration, particularly in the horse, even when the operation has been performed with skill and dexterity, and without any fault on the part of the operator, such as **hæmorrhage** (bleeding); **protrusion** of the **omentum** (net) or **bowels**; **septicæmia**, **peritonitis**, **tetanus**, **abscesses**, **scirrhus cord**, etc.

Bleeding may take place immediately after the operation, when walking the animal about, and dashing a few pails of cold water under the tail will probably set matters right; but when the hæmorrhage comes on a few hours after, the opening must be plugged with tow well saturated with tincture of iron and water; remove this in twelve or twenty-four hours afterwards, and re-dress if

necessary. This more often happens in the young bull than in the horse, and, in some cases, it is necessary to cast the animal again, get hold of the cord, and tie a ligature round it.

Protrusion of the Omentum, or Net.—This, like bleeding, may occur at the time, or a few hours after the operation; the protruding part can be cut off with a knife, or the scissors, close up to the body, without any bad effects following. This I have done several times.

Escape of the Bowels through the incision is very dangerous, and due, perhaps, to the animal having had **Scrotal Hernia** or **Rupture**. Should the bowels escape immediately the animal gets on to its feet, they must be at once secured in a large bed sheet, tied up round the loins, brought under the tail and over the quarter; the horse should then be re-cast, and the protruding bowel returned, and the opening secured by a wooden clam.

Septicæmia or **Blood-poisoning**, may result from the animal not being in a fit condition for the operation, also from the use of dirty instruments, or from the operator having unclean hands.

Abscesses.—These may form in the scrotum after castration, and give rise to a great amount of trouble. Hot fomentations must be used, and the parts opened when ready, that is when the swelling is soft and doughy to the touch.

Scirrhus Cord.—This is a thickening of the end of the cord, which sometimes follows after castration; it is generally of a hard nature, in which small abscesses may gather, burst, and become very troublesome. As to its origin, there is no well defined cause. The best and most radical treatment, is to cast the animal and dissect the diseased portion out, though some cases recover under the administration of iodine.

Peritonitis, or inflammation of the covering of the bowels, and **Tetanus** may also supervene (*see pages 99 and 199, respectively*).



FEMALE ORGANS OF GENERATION.—B.

THESE consist of the **ovaries**—right and left; the two **Fallopian tubes**; the **uterus** or **womb**; and the **vagina**, or passage communicating externally with the **vulva**.

The **Ovaries** are situated behind the kidneys in the sub-lumbar region of the abdomen, and are in connection with the fimbriated or loose ends of the Fallopian tubes. They are analogous to the testicles of the male, as in them is formed the ovum or egg, which is the essential element of the female for reproduction.

The **Fallopian Tubes**.—These canals run in an irregular manner from the uterus to the ovaries. They are possessed of fringed ends which are continually in motion, and their function is to seize and carry the ovum, or egg, to the womb.

The **Uterus** or **Womb** is a musculo-membranous structure, lying partly in the abdominal, and partly in the pelvic cavities. It is sac-shaped, and consists of a body with two horns, and a neck—the **os-uteri**. It consists of three coats, viz.:—

1. External—Serous.
2. Middle—Muscular.
3. Internal—Mucous.

The muscular coat is made up of two sets of fibres, viz.: longitudinal and transverse, which, by their contractions, assist in expelling the foetus, at the time of birth.

The **Vagina** or **Passage** is composed of two layers, an outer consisting of muscular and connective tissue, and an inner of mucous membrane, which is arranged in folds, enabling the passage to dilate during foaling, calving, &c.

The **Vulva** or external part, made up of two lips, is situated immediately below the **anus**, and is that portion of the female generative system presented to view. About four inches from the outside on the floor, is the opening of the **urethra** (*meatus urinarius*), or duct from the bladder.

In the virgin animal, is found a corrugated fold or doubling of the mucous membrane—the **hymen**.

DISEASES OF THE FEMALE.

Ovarian Diseases.—The ovaries of the mare and cow may become enlarged, diseased, or affected with dropsy; happily, however, such cases are uncommon in these animals. When present they are extremely difficult to diagnose, as it is only by negative symptoms that their presence can be determined even by an expert.

Ovariectomy, commonly called **spaying**, is an operation frequently performed on heifers and she-pigs in many districts, particularly in the midland counties. It is analogous to castration of the male; and the benefits claimed to be derived from it are, the convenient housing together of both sexes, and the tendency of spayed animals to speedily lay on fat, and if milking to give a larger supply.

Metritis, Inflammation of the Womb, is rarely seen except after difficult parturition, when it may result from too long retention of the foetus after the labour pains have set in, or from extreme force having been exercised in extraction of the young one.

SYMPTOMS.—In the cow these are great dullness, prostration, quick breathing, fever, straining, and discharge of a dirty brown, blood-coloured fluid from the passage.

TREATMENT.—If, on careful manual examination, no rupture or rent in the womb is discovered, wash it out by means of an enema syringe, with warm water and sanitas fluid, or phenyle, 1 to 80 of water. Internally, give 20 to 30 ounces of raw linseed oil, and if much pain be manifested, add from half to one wine-glassful of laudanum, or 15 drops of Fleming's tincture of aconite. As a fever medicine, 2 to 3 ounces of Epsom salts, and 3 drachms of nitrate of potash in a mash of bran, or in water as a draught, may be given every 8 hours. Warm water enemas thrown into the rectum, and porridge poultices applied to the loins, have a soothing effect.

Sheep.—In cold, frosty, spring weather, lambing ewes often suffer extensively from **septic metritis**, which, by its severity causes great loss to stock-owners. The sheep show similar symptoms to

those described in the cow—great prostration, and a dirty brown, coffee-coloured discharge running from the womb, and trickling down the legs, being the prominent characteristics. This disease is highly contagious, and immediately it makes its appearance, all the pregnant ewes must be at once removed from the place of infection, and be attended to by another shepherd.

TREATMENT.—Wash the parts night and morning with 1 table-spoonful of phenyle and 1 pint of cold water, which after being mixed, should be made warm by the addition of 1 pint of hot water. Give internally, twice a day, 1 drachm doses of chlorate of potass., and 5 drops of hydrochloric acid in $\frac{1}{4}$ a pint of cold water.

Leucorrhœa or Whites.—This complaint generally affects old animals—the cow particularly, and is characterized by the discharge from the vagina of a glairy, milky-looking, often bad-smelling fluid, which is sometimes so extensive as to cover the thighs and tail. It may arise from too long retention of the after-birth or cleansing, or from chronic inflammation of the vagina and womb. The parts are in a very relaxed condition, and the hand can be readily passed up the vagina to the neck of the womb, which is found to be thickened, and open enough to allow the passage of two or three fingers. After an attack of this kind an animal seldom breeds again.

TREATMENT.—Wash the womb out every second or third day with one wine-glassful of phenyle mixed in 1 gallon of cold water, or with 2 ounces of tincture of iron, or tincture of iodine, mixed in 1 gallon of cold water ; also give iron tonics with nux-vomica, or preparations of arsenic.

Vaginitis.—Inflammation of the vagina, like inflammation of the womb, is mostly due to damage done during difficult parturition.

TREATMENT.—Irrigate the passage with sanitas and water, or phenyle and water, and give fever medicine as recommended for metritis, but should there be a great amount of swelling externally, and extensive swelling and inflammation internally, the hand must not be introduced, as it does much more harm than good.

Pustulant Irritation of the vagina.—In extremely hot weather, both the mare and cow are liable to suffer from this affection, in

which there is great itching of the parts, a discharge of glairy fluid, slight swelling of the external parts, and constant whisking of the tail.

TREATMENT.—Same as metritis. When a mare or cow is affected in this way, the male must have no connection, as it might contract the same complaint.

Obstructions in the Vagina:—False Membranes and Cords are often formed in the vagina by a doubling of the lining membrane. They may run from side to side, or from roof to floor, and before parturition can take place they have to be cut with a knife, or broken down with the fingers. They usually cause some pain, the animal getting up and lying down as if in colic; but, as a rule, no constitutional disturbance results.

Long-necked Tumours are not infrequently found in the passage; these have to be either twisted or cut off.

Abscesses are sometimes formed in the walls of the vagina, generally in the lower part, between the floor of the passage and the roof of the bladder, but are also found in the sides or in the roof. They may result from bruises caused during parturition, especially in breech presentations, or from injuries done by mischievous boys pushing sticks up the passage. The most prominent symptom is continual straining. An examination must be made and the abscess opened, as described under abscess in the bladder (*page 238*); but this should only be done by the expert practitioner.

Protrusion of the Vagina.—The vagina is frequently found protruding or everted to the extent of eight or ten inches. This is most often seen in cattle that have been on board ship, and is very troublesome in summer weather when out at grass, for if it happens once, it has a tendency to recur about every three weeks. If it remains out too long it becomes swollen and congested, and before it can be returned, it has to be pricked in several places with a lancet, and the congested fluid pressed out; it should then be anointed with carbolic oil, returned, and kept in its place by stitches of **leather** or **tape**, put through the skin close to the rump bone with a packing needle, and carried across to the other side, but the stitches must, on no account, be put through the lips of the vulva.

Aged cows that have had a number of calves are very subject to this protrusion of the passage, when it is usually noticed five or six weeks before calving, while the animal is lying down, but recedes on rising. The best preventive of this is heightening the floor behind with some firm green sods which raises the hind quarters, and mechanically prevents the protrusion; as a rule it is rarely seen after calving. In both cases the protrusion seems to be due to **relaxation of the pelvic ligaments**.

Average Periods of Gestation :—

MARE—11 months, varies from 10 to 12 months.

COW—9 months.

SHEEP }
GOAT } 5 months, or from 20 to 22 weeks.

PIG—4 months, or from 15 to 17 weeks.

BITCH—9 weeks, or from 58 to 65 days.

CAT—8 weeks, or from 50 to 60 days.

For impregnation, the ovum of the female must meet the *spermatozoa* contained in the *spermatic fluid* of the male; to do so it usually travels from the ovary to the womb, by the action of the fringes of the Fallopian tubes, which grasp the ovum, and convey it along one of these tubes into the womb. Impregnation may also take place in the Fallopian tube itself, or even outside the womb, in the abdomen. When impregnation occurs, a series of changes begin in the womb. The segmentation of the ovum, and development of the foetus and its membranes, are of too complex a nature to be dealt with in this lecture but the placenta or cleansing is deserving of a short description.

The **Fœtal Membranes** (**Placenta** or **Cleansing**) are three in number, namely the **amnion**, **allantois**, and **chorion**.

The **Amnion** or **Slime Bag** is thin and transparent, and in it floats the foetus, surrounded by slime.

The **Allantois** or **Water Bag** is situated outside of the amnion, and between it and the chorion.

The **Chorion** is situated next the womb, and is the vascular coat.

A marked difference is seen in the attachment of this coat in the mare, as compared to those of the cow and sheep, in which there are a large number of **cotyledons** or **rosebuds**, consisting of ramifications of foetal blood-vessels, intimately connected to similar structures on the womb.

In the mare, however, the attachment is brought about by **villi**,—small sprout-like projections,—which dovetail into each other, and are continuous all over the outside of the placenta, and inside of the womb.

The foetus is connected with the placenta by means of the **umbilical cord** or **navel string**, which is made up of

1.—The **Umbilical Vein**, carrying pure blood from the placenta to the foetus.

2.—**Two Umbilical Arteries**, conveying venous blood back to the foetal membranes.

3.—The **Urachus**, a tube in connection with the bladder, which carries the water to the womb.

The blood of the mother does not circulate in the body of the foetus directly; the offspring being nourished by the aid of the villi on the outer coat of the placenta, which absorbs nutrient material from the blood of the parent supplied to the womb.

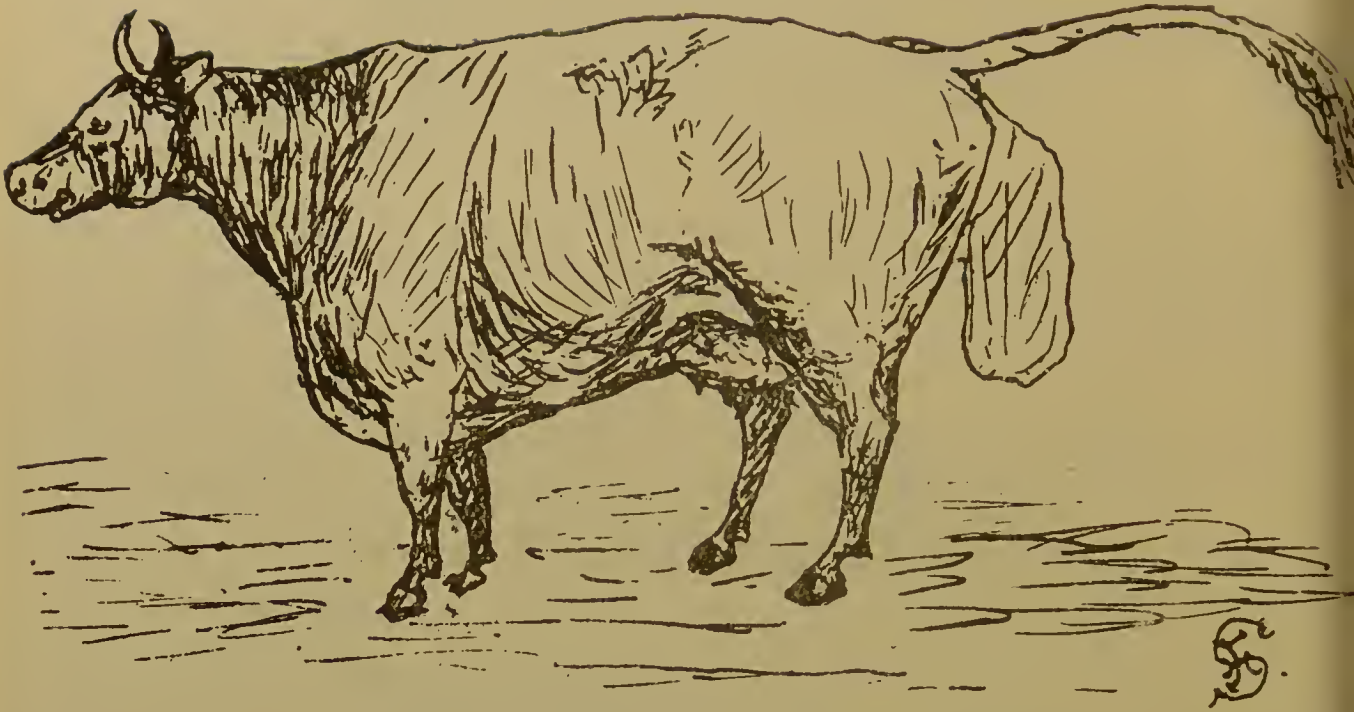
Abortion, Slinking, Slipping, or Casting the Calf.—Of all the diseases that infest the stock of the farm and fold, that of abortion may be looked upon as the most serious. This malady has been known from time immemorial, reference being made to it in Biblical History, for according to Genesis, 31st chap., verse 38, Jacob seems to have held the secret of its prevention; it is a great pity he did not leave it behind him, for our benefit in these days.

Abortion is not very common in the **Mare**, and when it does occur it is generally the result of an accident.

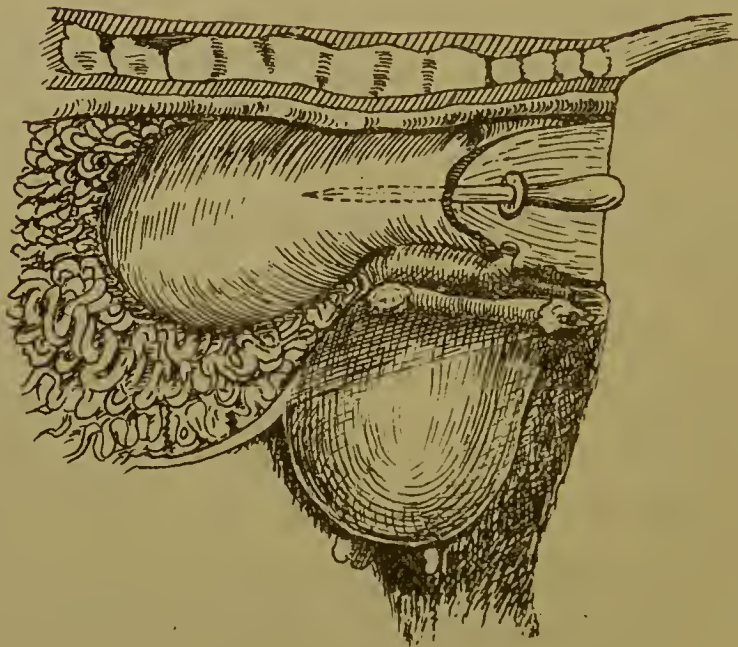
Sheep are more susceptible to its baneful influence, but nothing to the same extent as the



A.



B.



COW IN PARTURITION.—A.

IMPERFORATE HYMEN.—B.

Cow, in which the causes of abortion are numerous ; a solitary case may occur from some injury, such as the animal being caught in a gate or doorway, or by a goad from another beast ; from indigestion and distension of the stomach with gas, causing pressure on the gravid uterus, and displacement of some of the placental attachments ; from urticaria and from specific diseases, as "foot and mouth" ; also from bleeding, the administration of poisonous drugs, &c.

When the complaint rages in the epizootic form, and attacks stock on various farms for miles around, it is then that its baneful effect is most bitterly felt. Most of the abortion outbreaks that have occurred in my district, have been cases where a farmer changed his holding, sold off his cattle, and then purchased from other farm-sales, and auction marts, a new stock of in-calf cows, most of them three parts gone in calf ; when from injury caused by galloping, or by mounting on each other's backs, one or more of them aborted. Again, from being tied up on the wrong side in a strange byre amongst strange companions, a cow of a fretful nature, becomes so unsettled that it casts its calf, with the result that most of the others do the same, more especially if the animal commencing it has come from an infected herd. The introduction of a newly aborted animal into a byre, or pasture, containing in-calf animals is often the means of spreading the pest, while allowing a cow, even at full time, to calve in a byre amongst others that are pregnant is sometimes a cause.

Ergot of Rye, eaten by the cows, has been named as a great producer of the malady, but I have never yet been able to trace an outbreak to this source. The complaint is as frequent in winter as in summer, and if ergot is a cause, it is difficult to imagine how a cow fed on roots, straw, and hay, can get a sufficient quantity of ergot to produce abortion.

That the epidemic form is highly contagious, there can be little doubt, and it is now thought by many to be due to a **micro-organism**. This may be so, but I am not yet convinced that the germ enters the gravid uterus by means of the vaginal passage, because it is well known that the neck of the womb, during gestation, is hermetically sealed against external influences.

Abortion, in my opinion, is of as great importance as tuberculosis, and ought to be legislated upon by the government, and an Act of Parliament should be passed making criminal the exposure for sale of an aborted animal, or the sending out to grass, amongst other pregnant cows, an animal that has slipped its calf, until a stated interval has passed. Formerly it was the general custom, when an animal cast its calf, to prepare it for the fat market; this is done by many yet, but on some farms the animals are now kept back for a certain period and again served, and in the course of from two to four years, the complaint dies out. This is a much better plan than fattening off and replacing with stock from an unknown and perhaps affected place.

PREVENTION.—As the causes are various, so are the measures for prevention; nearly every district has some peculiar old fashioned fad of its own—such as burying the aborted calf under the doorstep of the byre, or keeping a male goat amongst the stock, &c. Immediately a cow shows signs of parting with its calf, it should be put into a box and left there to calve by itself, *in fact, no cow should be allowed, under any circumstances, to calve amongst other pregnant animals*, and for this reason, every stock-breeder should have at his disposal one or more nursery boxes for this purpose. When an animal casts its calf, the utmost care should be taken to keep it from contact with any others that are pregnant, whilst the byres should be cleansed down, and washed with lime wash and carbolic acid, once every two months. Little's phenyle, in the proportion of 1 to 80 of water, should be sprinkled over the tail and hind quarters of the other animals with a watering can, night and morning; chlorate of potash in doses of from 2 to 4 drachms, or pure carbolic acid, 2 to 4 drachms, should be given them every other day, in a mash of bran.

CAUTION.—Irritating germicidal mixtures should not be injected into the vagina of a pregnant animal, though often recommended; they cause great pain and straining, and are more likely to bring about abortion than to prevent it.



PARTURITION IN THE MARE, THE COW, AND THE SHEEP.

Before describing the illustrations of some of the various presentations met with in parturition, as shown on the plates, I will refer to that of

Imperforate Hymen, known as **Impervious Os-Uteri**.—In the virgin heifer in perfect health, the vagina is very much corrugated and constricted immediately in front of the neck of the bladder, but beyond its external opening. In this complaint the vaginal passage is entirely obliterated by these corrugations. Strange to say, this lesion is mostly seen in white heifers; I have operated on a large number, but have only met with one coloured animal—a light roan heifer. The animal rarely shows any indications of the complaint until it has been served; then the symptoms are developed in a period varying from 12 hours to 6 weeks, the principal portion of the cases occurring in from 12 to 20 days, when the patient is noticed to erect its tail, and strain, and press, as if about to calve. Any fæces which may be in the rectum is forcibly ejected, and in severe cases, the rectum is turned out, and bloody mucus is discharged from the vagina.

After getting the history of the case, the operator should oil his hand, and introduce it gently into the rectum. Immediately the hand is passed through the anus, a tense, more or less distended body is felt beneath the floor of the bowel. By passing the hand further forward, this bladdery distension is found to extend into the cavity of the belly. Understanding what is amiss, he should withdraw the hand, and pass the fore-finger of the left hand into the vaginal passage when, immediately in front, and above the neck of the bladder the obstruction will be found, and a roughening felt, a result of the penetration of the male organ in the act of serving.

TREATMENT.—For relief, an operation is necessary. A trocar and canula (the latter being 10 inches long and $\frac{5}{8}$ ths of an inch in diameter—**Plate XLIV.**, *fig. 11*), is passed up along the vagina and

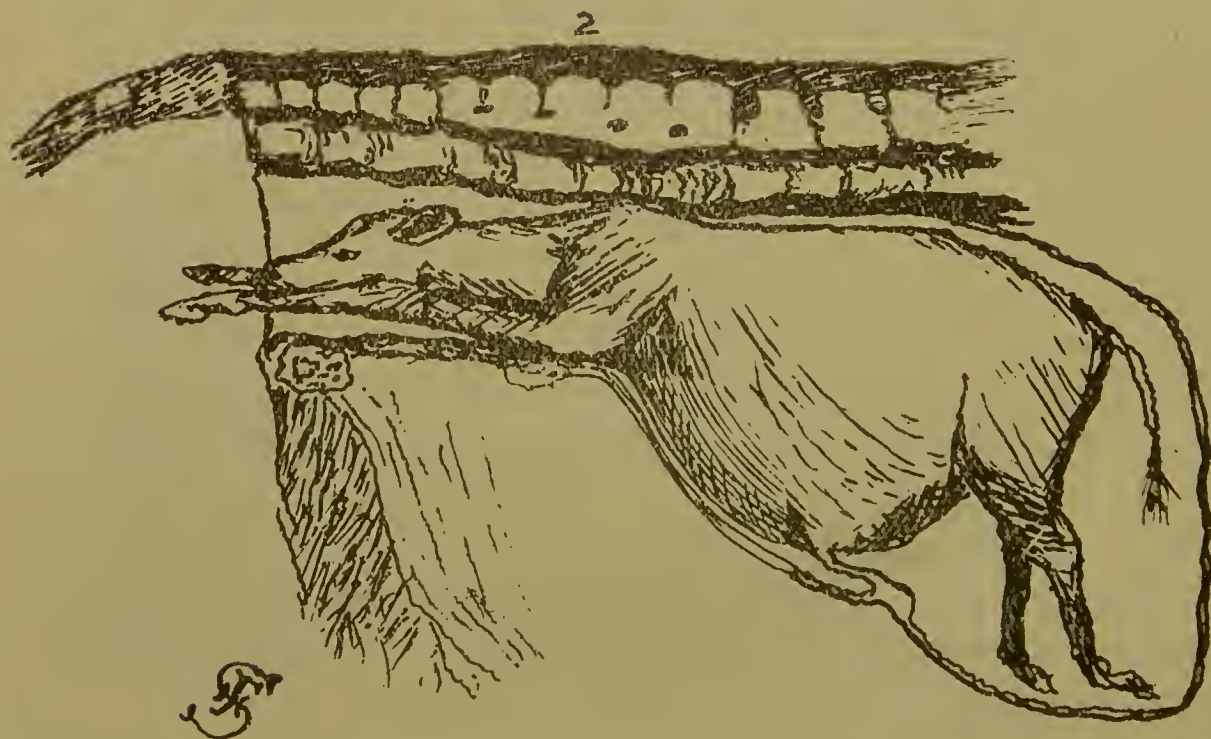
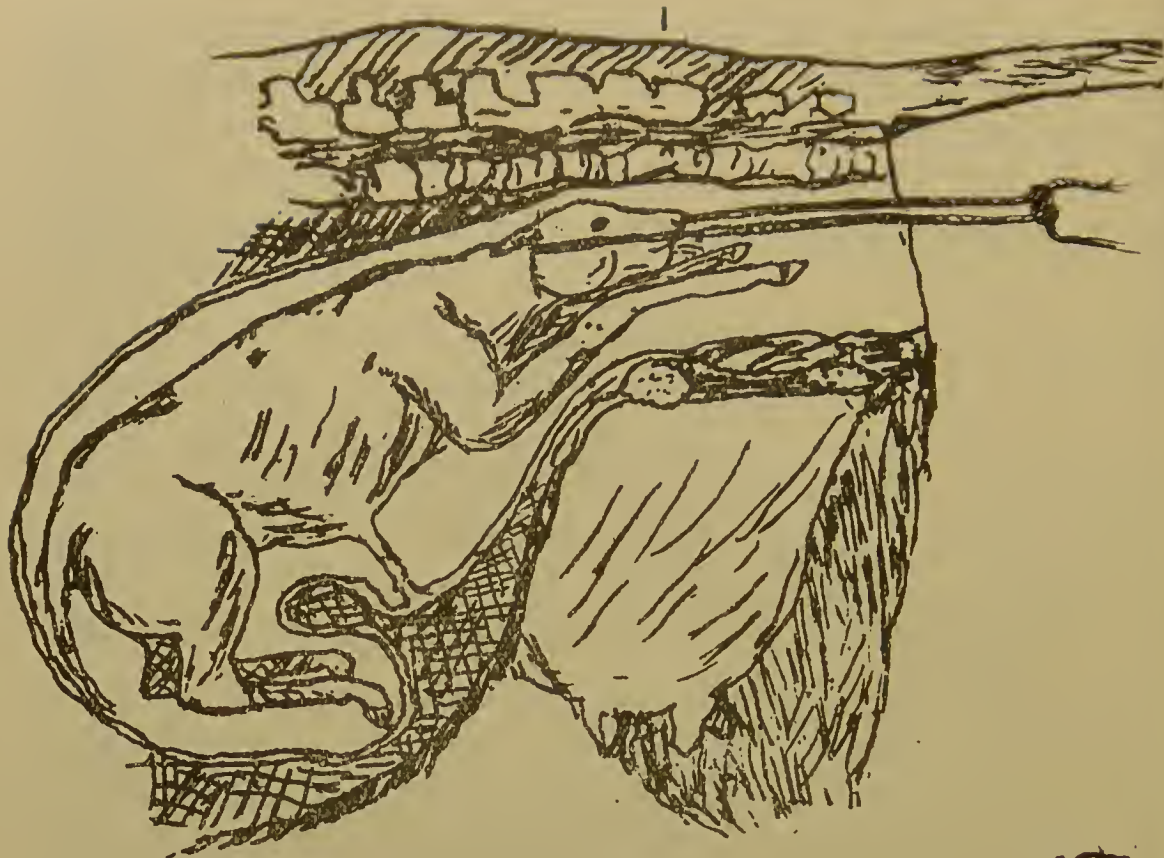
guided by the fore-finger of the left hand (the point of the trocar being withdrawn into the tube) until the roughening is reached, when both are forced through the obstruction into the bladdery tumour. The trocar is then withdrawn, when the fluid contents escape through the canula, being very much assisted by passing the hand into the rectum.

The parts are next washed out with a gallon or two of tepid water containing one ounce of tincture of iron.

I have also operated upon animals that have not been served; (one case being that of a white heifer, nine months old), the fluid in these cases is like dirty, milky-whey with a very fœtid smell, while in those who have been served, the fluid is of a dirty brown colour with a "stink" resembling that of a decayed cleansing.

Plate XXXVI., fig. 1 is the natural presentation seen in the domestic animals, the nose being between the knees, and the fore-feet protruding through the vulva. At a cow's first calving, all the pelvic ligaments may be well relaxed, yet in some cases there is a constricted band round the vulva or outer opening for about an inch-and-a-half, with little or no relaxation of the parts. The owner or attendants usually seize hold of the two fore-feet, and pull until the shoulders and the head of the fœtus are jammed tightly in the passage, when, owing to the constricted condition of the vulva, the head recedes, but at last, by main strength, the fœtus is forcibly extracted, causing extensive laceration of the vaginal passage and fatal hæmorrhage. In these cases, the hand ought to be introduced into the passage, and the head of the fœtus and its surroundings carefully examined; a strong cord should be passed over the head, behind the ears of the calf, bringing it along each side of the calf's face, knotting the ends outside, thus forming a loop (*see plate*), when, by traction on this cord, and manipulation with the other hand, the head is delivered, and carefully pulling *first one leg and then the other* until the fœtus is extracted.

Fig. 2 represents a case of dropsy of the belly of the calf. The presentation is natural, and though there seems to be plenty of room, all the force which the owner or attendants can use, fails



3

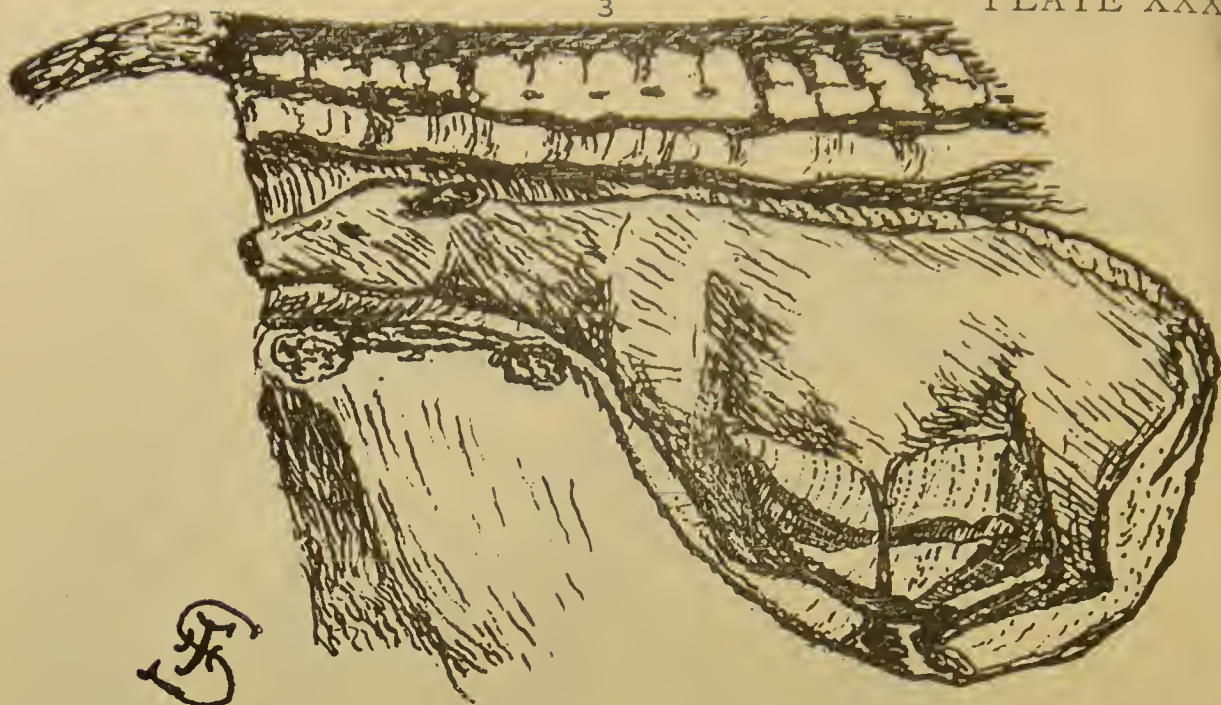


Fig.

4



Fig. 94

5

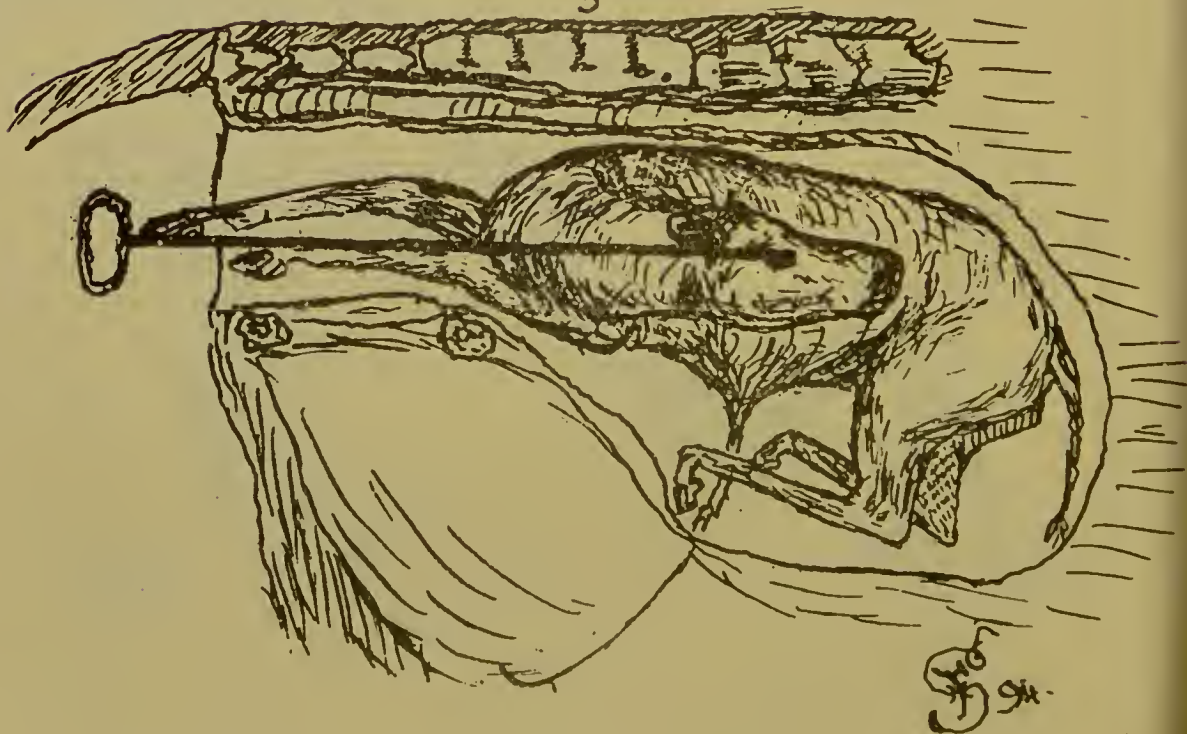


Fig. 95

to accomplish delivery. By passing the hand over the head, neck, and shoulder of the foetus, the cause of the obstruction is found in the distended belly of the calf. Some practitioners press a large trocar through the breast or between the ribs of the calf, whichever is the easier of access. For my own part, I prefer passing the ordinary parturition hand knife (*see plate xliv., fig. 2*) between two ribs of the foetus, when it and the water come away readily.

Plate XXXVII., fig. 3 represents the head presented with the feet back and down. In some cases, the head may be pressed back and the feet got up, especially in the mare and ewe, but in the majority of cases it is necessary to dissect the skin back and cut the head off by the first joint of the neck (*atlo-axoid articulation*), tying the skin firmly round the end of the bone, and leaving the end of the cord outside, then by pressing the neck back into the womb and getting up the feet, delivery is accomplished.

Fig. 4 shows a very common but troublesome presentation. In this we have both fore-legs protruding, while the head is bent back, with the nose pointing forward behind the elbow.

Fig. 5 is a somewhat similar presentation to the last, but the nose is pointed backwards towards the flank.

Plate XXXVIII., fig. 6.—The fore-legs are presented as in 4 and 5, but the head is turned over on to the back of the foetus.

These cases are generally made more difficult by the attendants seizing the fore-legs and pulling them, without examining the position of the head. The feet should be got hold of with cords, and the head secured either by putting a hook into the eye socket or angle of the jaw, or by fastening a strong cord round the under jaw; the foetus must then be pressed back into the womb, and the head manipulated into position.

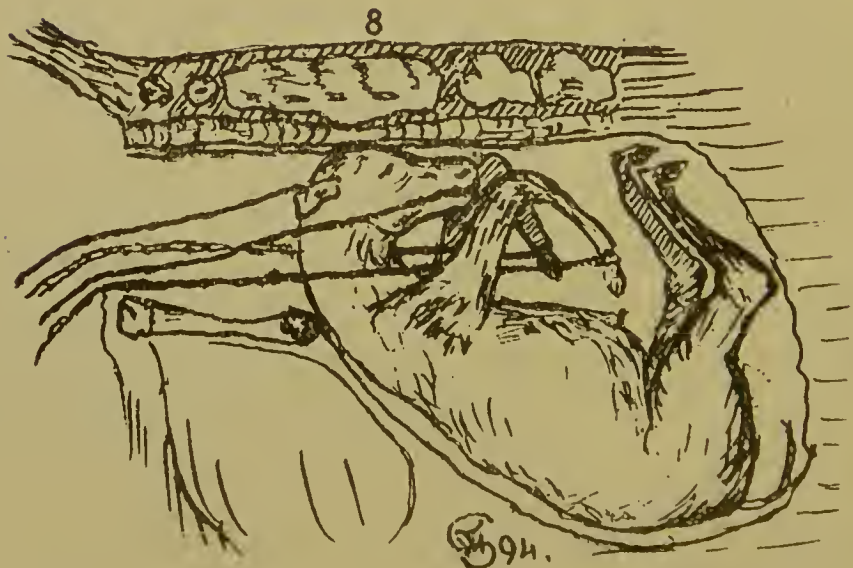
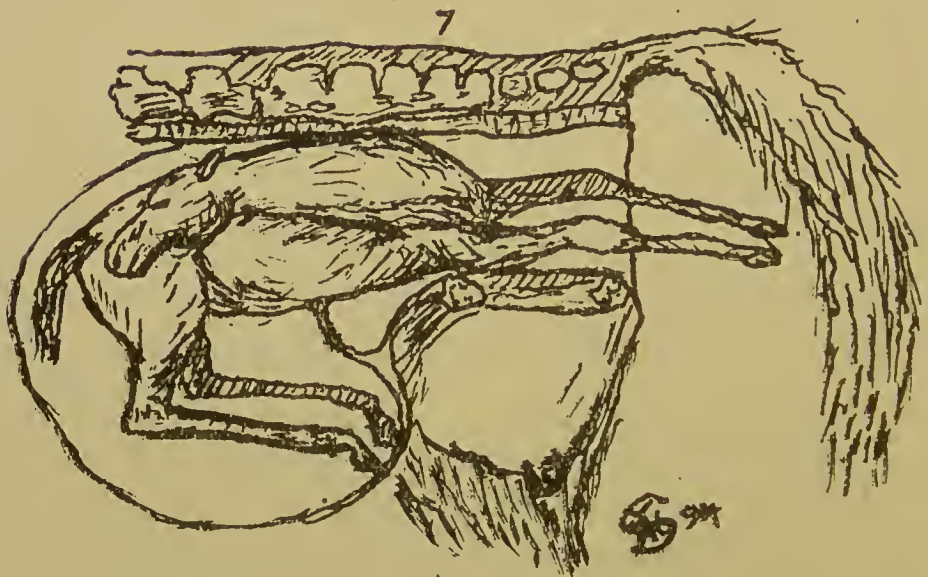
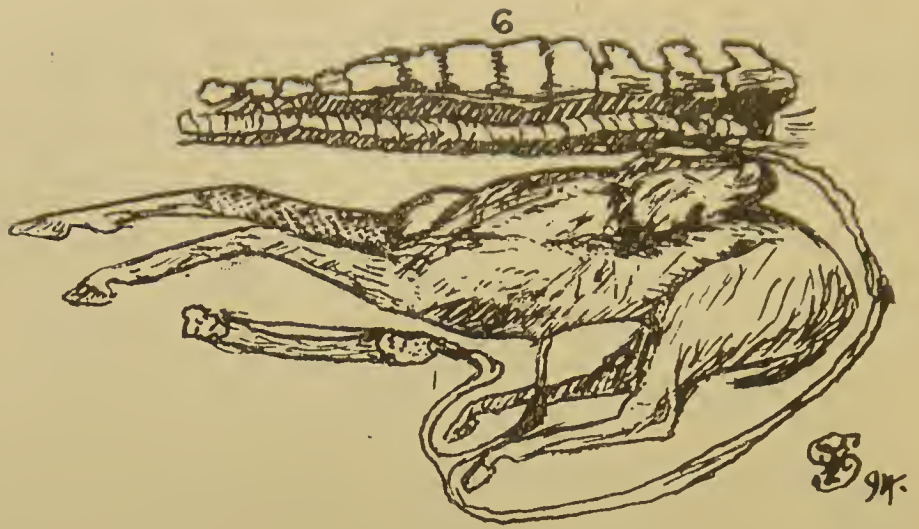
A great deal of trouble is caused by persons tinkering with cases too long before sending for veterinary aid; all the natural waters having been expelled, and the uterine pains exhausted, while the uterus itself has contracted on the foetus as tight as a glove on a lady's hand. When a case like this is met with, the best mode of

procedure is to make 8 to 10 quarts of linseed jelly; strain it through a cloth, and with Read's patent enema syringe, pump it into the womb over the body of the fœtus. The linseed jelly not only distends the womb and floats the fœtus, but acts as a lubricant in place of the natural waters. If the head cannot be got into position after this (which is often the case), the finger knife or large embryotomy knife (*see plate xliv., figs. 1 and 7*) must be carried as far on to the shoulder as possible, and pressed through the skin, which must be divided down the whole length of the limb to the fetlock.

Previous to cutting, a cord ought to be fixed round the pastern joint, which an assistant should pull steadily outward. The skin is next detached from the shank-bone and secured by a small cord; then with the fingers the skin is separated from the rest of the limb, up and well over the shoulder, as far as can be reached. The knife is again introduced, and the muscles between the shoulders and the body (pectorals) are divided. Strong traction is then applied to the rope round the fetlock or above the knee, when the limb generally comes away. The head may then be got into position, but if this is not yet possible, the other fore-limb must be removed in like manner, when the fœtus loses its support, and drops into the bottom of the womb, thus allowing the head to be got round by means of hooks and cords, delivery following.

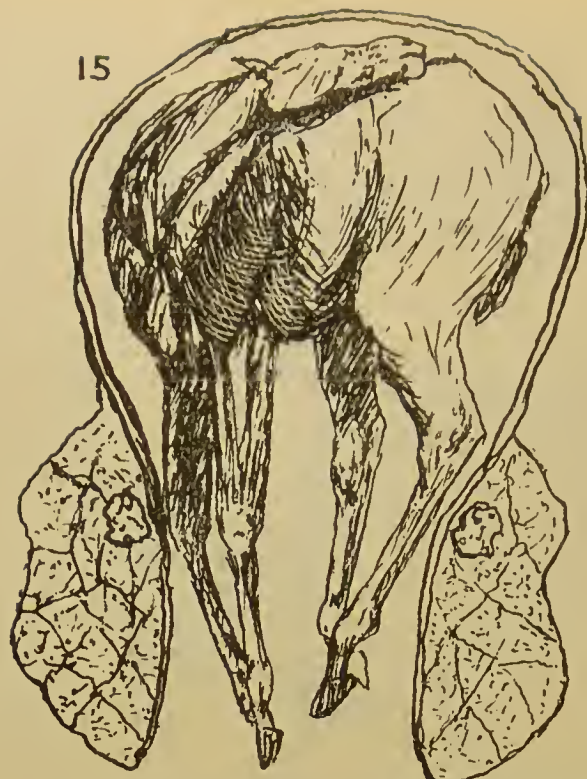
Fig. 7.—Both fore-legs are presented, and the head is thrown back on to the hind quarter—a very common occurrence in the mare,—the bones of the face of the fœtus are developed to correspond with the convexity of the quarter. The feet are usually seen outside the vulva, but only the tips of the ears can be reached. In this case, the operator should waste no time in trying to turn the head round, but proceed at once to remove the fore-legs, and turn the head as already described in the preceding case. This last presentation, in the mare, I consider one of the most formidable to be met with.

Fig. 8 represents the fœtus on its back, with the ears and back of the head presented, and the feet back. This is most readily put right by casting the patient, rolling it on to its back, elevating the quarters with trusses of straw, and bringing the head of the fœtus

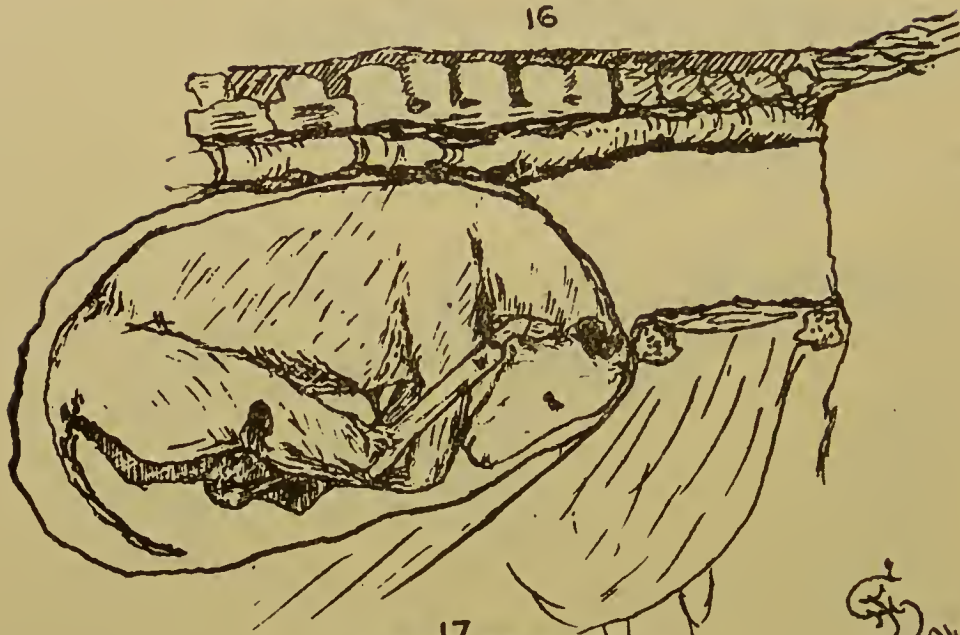


These cases are of frequent occurrence in the mare, and each can be made either a very easy operation, or a most difficult one. It is the latter, if some one has pulled the fore-feet outside the passage as far as the knees, while the head is beyond reach and pressed back into the uterus (*as in fig. 7*). This, however, is rendered more difficult through having the hind-feet in the passage. But, if called early, or before any interference has taken place, as shown in *fig. 14*, the case may readily be adjusted and delivery accomplished in a very short time, by attaching strong cords to the *pasterns* of the *hind limbs*, and while the cords are pulled alternately by assistants, the operator presses the fore-feet back into the womb. The hind quarters come into the passage, and, by careful and steady traction, delivery is soon over. When the fore-legs are jammed in the passage as in *fig. 15*, for the safety of the mother, press the hind-feet back over the brim of pelvis, remove the fore-legs as described under *figs. 4, 5, and 6*, then bring the hind-feet forward by cords attached (prior to their being repelled); the operator then presses the breast of the fœtus back into the uterus, while assistants pull it away, hind-legs first.

Fig. 16 represents a case with the back of the head and neck presented, the fore-legs bent back and the pastern joints doubled round the thighs, while the hind pasterns are pressed against the brim of the pelvis of the mother. The fœtus is as rigid as if all the joints were ankylosed. Referring to a case which occurred in the practice of Mr. Fisher, V.S., Whitehaven:—after many attempts to straighten the head (resulting in failure) it was at last cut off, and a strong cord fixed round the neck, close down to the breast—the body of the foal could not then be stirred; the upper shoulder was with great difficulty next cut off, a cord passed round the humerus, and with strong pulling the leg came away. The sternum (breast-bone) was then detached on each side with the knife, and extracted; the first four ribs were removed, by passing the knife between the ribs up to the backbone, and twisting them off; the contents of the chest and belly were torn out, and the remaining fore-leg and the two hind-feet were pressed towards the spine of the eviscerated fœtus, while assistants pulled on the neck cord, and extraction followed. The operation lasted four hours, and the mare afterwards did well.



16



17



Fig. 17 is a transverse presentation, where the fœtus is lying crosswise in the womb, with the points of the hocks presented towards the *os-uteri*, and the quarters pressing to the off-side of the mother, with the hind-feet pressed firmly against the near side; the point of the tail within reach, but the feet and pastern joints cannot be touched.

The best mode of procedure, in this case, is to cut through the ham-string (*tendo-achillis*) above the point of each hock, bringing the latter outwards with the hook (*plate xliv., fig. 6*), put a loop of good strong cord round the joint, press the front of the shank-bone against the front of the tibia, or leg bone, and pull the hind-legs into the passage, when extraction of the fœtus follows.

Plate XLII., figs. 18 and 19 represent twins. In all cases of parturition, before any cords are attached or any pulling attempted, careful and minute exploration and examination must be made, more particularly so in cases of double or triple birth, in order to make perfectly certain that the legs seen or felt belong to the head and neck of the fœtus presented.

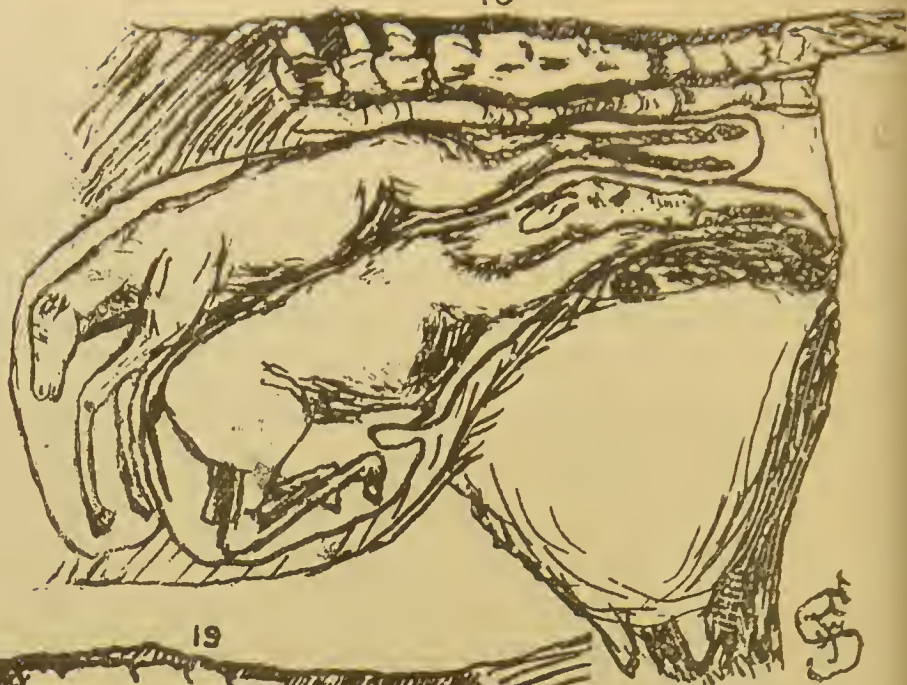
Fig. 20 represents a case of a monstrosity, in which the hind-legs are doubled over the shoulder, and the fore-legs under the chin, while the walls of the belly are reflected over the hind-legs, with the bowels floating loose in the womb of the mother. When the bowels are presented first, after careful examination, they must be removed; then with a knife (horse-shoeing knife for preference) cut through the back-bone at the most convenient point and extract the portion readiest to hand by passing in the large hook. When the head and feet are presented the case is more serious; sometimes one or both of the fore legs may be extracted, and by putting a cord round the head, with strong pulling, the back-bone may be broken through. After removing the front portion, the rest is got away with hooks, while the viscera follow.

Plate XLIII., fig 21—Torsion of the vagina, or twist in the neck of the womb. I have had several of these (three in the mare); but except in the first case (a cow, which was killed), I have never found a complete twist, but only a partial one.

The animal may show signs of parturition, paddling with the feet, screwing the quarters, and whisking the tail; the pelvic ligaments and vulva are relaxed, but there are no pronounced labour pains. On introducing the hand into the passage, about three-quarters of the way up, a distinct corded thickening is felt on the lower part of the passage, running from right to left or *vice versa*, resembling half a screw. After passing the hand over the screw-like parts a pouch is found just in front of the neck of the womb (*os-uteri*). On reaching the womb, the foetus may be felt. If lying in the position represented in the figure, the head and feet must be secured with ropes and hooks, and brought gently forward, and jammed as far into the passage as possible. In some cases, when this is done, the animal drops suddenly on to its side, and thus undoes the partial twist, resulting in ready delivery. In other cases the patient has to be cast and rolled; if the twist is to the left, the operator must get a firm hold of the foetus and press it to the right or *vice versa*, when the animal is directly on its back, steady traction being put on the ropes, the uterus may suddenly right itself, and delivery is accomplished.

Constriction of the Os-uteri, in the cow, is known in Cumberland as "horny lyer." On introducing the hand, the neck of the womb is found closed up, is very hard, and will only admit of one finger; when the pains are very strong, a good dose of opium (2 or 3 drachms suspended in hot water), or from 6 to 8 drachms chloral hydrate should be given, while the *os-uteri* ought to be smeared with a drachm of extract of belladonna; keep the patient perfectly quiet, and leave it alone, when in the course of from twelve to twenty-four hours it may calve all right. Sometimes a cartilaginous ring round the neck of the womb is met with, through which the hand cannot be passed; this ring has a kind of flange, from about three-quarters to one inch in breadth, and about one-eighth to a quarter of an inch in thickness. This must be cut on the upper portion, and also on each side. Smear well with extract of belladonna; give a good sedative (opium or chloral) and wait patiently. But sometimes relaxation does not take place; then delivery has to be accomplished by cording the feet and head, bringing them into the passage, and by taking plenty of time and care, it may be successfully managed.

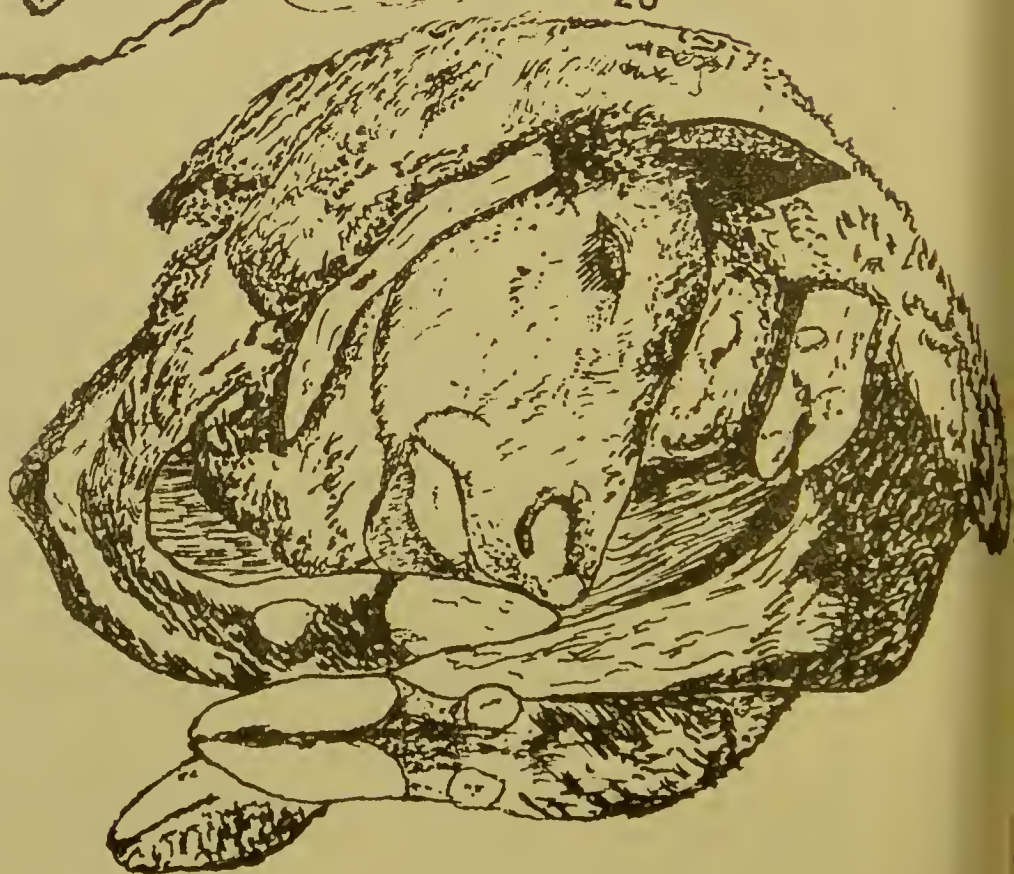
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19



20



The Cæsarean Section.—This operation may be performed where the offspring is alive and of more value than the mother. I have been successful on many occasions in saving the lives of foals, calves, lambs, and pigs, but at the sacrifice of the mothers.

Retention of the Fœtus is sometimes seen in cattle. At the end of the period of gestation, the cow shows all the signs of approaching parturition, the udder is distended, the teats pointed, &c., but there are no direct labour pains, and the animal, though feeding, loses flesh; in a few months after, it begins to pass various bones per rectum. In other cases the fœtus may become mummified, and its presence not discovered till after slaughter.

In frosty weather, ewes in lamb have occasionally **eversion of the vagina** with the **os** constricted, giving rise to severe straining pains. Apply the extract of belladonna, and return the vagina to its position, keeping it there with stitches across the vulva, till the os dilates, and give linseed oil, 8 to 10 ounces, with 4 drachms Tinct. Opii (B.P.). If the weather is mild, these cases may do well, but if the frost continues, they generally terminate in inflammation and gangrene.

Inertia of the Uterus is where the uterus and vagina are intensely dilated, or in a soft flabby condition, the fœtus lying in natural position, yet no attempt to expel it is made by the mother. I have had most success by introducing the hand into the womb, seizing hold of the fœtus, and drawing it slowly and gently into the passage. Extraction is generally effected without any assistance from the mother.

Placenta Prævia.—Cases are met with in the cow and ewe, where the greater portion of the after-birth comes away prior to the birth of the offspring. It is very troublesome, and has to be cut or torn away before delivery can be accomplished.

I remember one case where the whole of the cleansing came away from the cow before the calf. Great care has then to be used in manipulating the fœtus into proper position for delivery.

Hydrops-uteri.—Dropsy of the womb before parturition. This is often seen in the cow and sheep, and occasionally in the mare.

As the animal nears the end of gestation, the belly gets to a big size, oppressing the patient, rendering it very weak and languid, and also causing wasting of the flesh.

For support, a good broad bandage should be rolled and secured round the body, and good, nutritious food given; wait patiently until parturition sets in, when, as a rule, an enormous quantity of water comes away, accompanied by a small ill-nourished foetus. In extreme cases, tapping the womb on the right side with a fine trocar and canula has to be resorted to.

Abnormal Conceptions are recorded, where the young ones were developed in one of the horns of the womb, or in the belly outside of the womb altogether (**extra uterine conception**).

In company with Mr. J. Young, V.S., Lancaster, and Mr. Jos. Hewson, V.S., Carlisle, I saw a case of the former in a Clydesdale mare. The vagina and neck of the womb were relaxed and open, the womb dilated to a considerable extent, but nothing in the shape of a foetus could be found inside. On the right side, about ten or twelve inches from the neck of the womb, was a constricted rigid ring; on passing the hand through this, the stifle of the foetus could be touched with the ends of the fingers at full stretch; the body of the foal could be distinctly felt through the walls of the vagina and womb; the horn of the uterus being doubled, the head of the foal was in the pelvic cavity, and its nose close to the anus of the mother. After many hours hard work, we failed to effect delivery, and the mare was destroyed. The position of the foal, and the doubling of the horn of the womb, indicated a breech presentation.

Some years prior to the foregoing occurrence, I had a similar case in a black-polled cow, but the calf was lying in the opposite direction, with its tail next the anus of the mother, and could be distinctly felt through the walls of the womb. I attended the case for three days, during which time I made numerous attempts at delivery, but failed, the cow having to be slaughtered.

In all cases of difficult labour, although a great amount of patience, perseverance, and manual labour is required, success mainly depends on the judicious use of both hands and instruments,

or, as PROFESSOR WILLIAMS tersely puts it :—" difficult calving and foaling are accomplished by the exercise of the brain."

" Neither the naked hand, nor the understanding, left to itself, can do much ; the work is accomplished by instruments and helps, of which the need is not less for the understanding than the hand."—*Lord Bacon*.

Retention of the Placenta, or Afterbirth.—This, in the mare, ought never to be allowed to remain more than from six to ten hours after the birth of the foal, more particularly when the mare is on dry food, in the stable, as it often brings on **septic laminitis** (inflammation of the feet—founder—*see page 63*) ; in some seasons, this almost resembles an epidemic. This may be avoided by the timely removal of the membranes, which must be carefully done, as the smallest piece left is quite sufficient to cause a great deal of constitutional disturbance, and in some cases, septic poisoning and death.

The **Cow**, on the other hand, can retain the foetal membranes from six to eight days, with little or no constitutional derangement. I have attempted their removal at times varying from six hours after calving until the eighth day, and I find at the fifth or sixth day they may be sometimes successfully taken away. I generally inject into the uterus eight or ten quarts of tepid water, containing a small portion of Little's phenyle, or of sanitas, then on introducing the hand, by gentle traction and twisting of the membranes, they can be removed.

I have great objection to cutting small pieces off the portion of membranes hanging outside, and have still more objection to farmers hanging a horse-shoe, or other weight, to them. When the animal is feeding, milking, and chewing the cud, I recommend leaving it alone until the sixth or seventh day, in winter, or the fifth or sixth day in summer, rolling the membranes which are outside into a knot, to be out of the milker's way, and then taking away as described above. After removing the placenta from the mare and cow, I generally inject into the womb five or six quarts of tepid water containing one ounce of tincture of iron, which is a good antiseptic. Notwithstanding the decayed and foetid condition of the membranes, I have never yet seen a cleansing struck with fly or maggot !

Dropping from Retention of the Second Cleansing.—Cases are met with where the afterbirth comes away all right a few hours after calving, but in the course of from two to six days the animal is found lying down and unable to rise, yet it feeds, chews the cud, and milks fairly well; the breathing is quick and heavy, and the temperature is normal, but still the patient cannot get up. The vulva is puckered up and quite dry, yet no discharge is seen from the passage. This condition is, by many, considered to be milk fever.

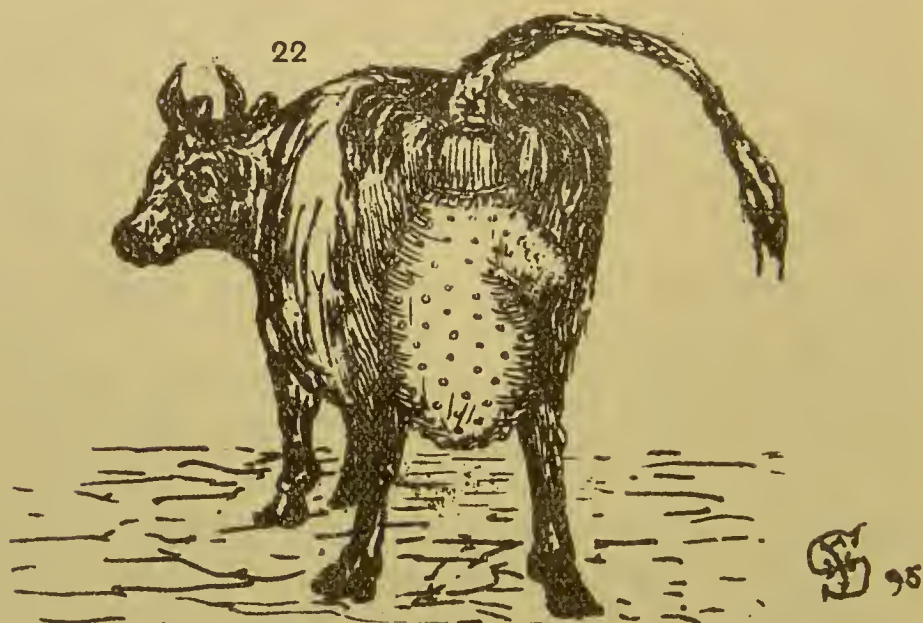
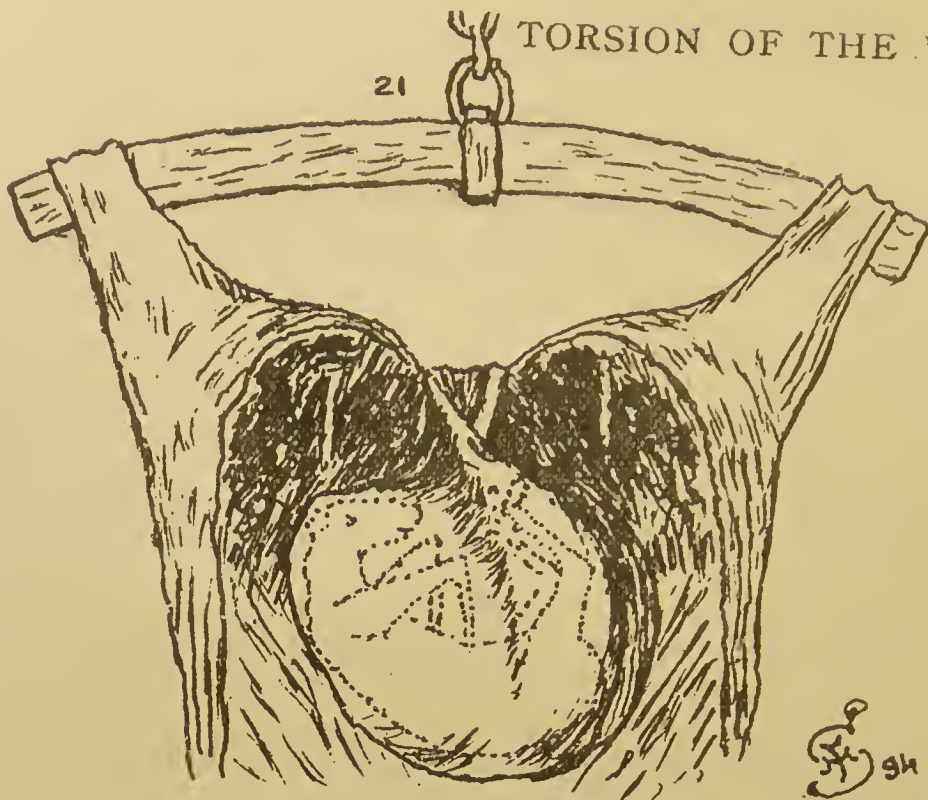
The loss of power is due to the too sudden closing of the neck of the womb, behind which the discharge or second cleansing collects and is retained.

TREATMENT.—Give a good dose of opening medicine, say one pound Epsom salts and two ounces ginger in a quart of treacle gruel, to which add one pint linseed oil; apply a strong mustard poultice over the loins and clothe the body, when, in the course of twenty-four hours, the animal discharges from the womb a quantity of bloody, slimy fluid, after which it becomes all right. At times the retention of the second cleansing sets up

Septic Fever, more particularly in the early spring months, when east winds prevail. About three or four weeks after calving, the cow is noticed to be losing flesh and getting into a low and debilitated condition, with tucking up of the belly, falling off in milk, having little or no appetite, and occasionally chewing the cud, the bowels are constipated, the dung being hard and dark coloured, the vulva or shap is puckered-up, and of a dirty yellow appearance, and the patient has a peculiar fusty smell. In some cases it is associated with parturient bronchitis or pneumonia, (*see page 171*).

TREATMENT.—Antiseptic tonic medicines are necessary, such as sulphite of soda, iron, quassia and vegetable cordials given in treacle gruel, with the addition of a quart of beer or half-a-pint of spirit; small doses of linseed oil should be given every other day, and the appetite tempted with different kinds of food; for preference, sliced mangold and potato sprinkled over with a little salt,—green foods answer best. Frequent washing out of the womb in these cases is very objectionable; it retards recovery.

TORSION OF THE VAGINA.



EVERSION OF THE UTERUS.



COW IN MILK FEVER—(See Page 192).

Post-Partum Hæmorrhage, or flooding after calving, is mostly seen at the first calving, and is generally due to too hasty and rough usage (*see Parturition fig. 1—page 256*).

This dangerous, and often fatal hæmorrhage requires prompt attention; the animal must be kept perfectly quiet, and cold water sheets applied to the loins and quarters; if the bleeding is profuse, a cotton bed-sheet must be put into a pail of cold water—to which is added 1 ounce tincture of iron—wrung partly out, and packed carefully and quietly into the vaginal passage, and left there for three or four days, or until it comes away by itself; give 5 or 6 eggs, beaten up in half-a-pint of whisky or brandy, in 1 pint cold water, every five or six hours.

In many cases, after the bleeding has stopped, the animal will go on doing well, feeding, chewing the cud, milking, &c., for about twelve or fourteen days, when the bleeding breaks out again, and before anything can be done, the patient bleeds to death. The greatest care and watchfulness is needed from the tenth to the twentieth day.

Rupture of the Womb (mostly seen in the mare).—This may occur from the strong pains of the mare, forcing the foot of the fœtus through the walls, or it may be torn and ruptured in manipulating a mal-presentation of the fœtus, when the bowels of the parent sometimes protrude. These cases are usually fatal.

The fore foot of the fœtus may be so forced through the roof of the womb and the floor of the rectum, as to come out at the anus; or the anus and vulva from the same cause may be made into one common opening. Extensive sloughing usually takes place in these cases.

Eversion of the Uterus.—This is not of very frequent occurrence in the mare, but often happens in the cow, ewe, and sow.

In the Mare.—If in a standing position, immediately the womb is in sight, every care should be taken to keep the animal on its feet. The womb must then be supported by a large table-cloth, held by two assistants, one on each side, and the patient led on to a good incline, with its hind feet on the top, and for this purpose, a manure heap

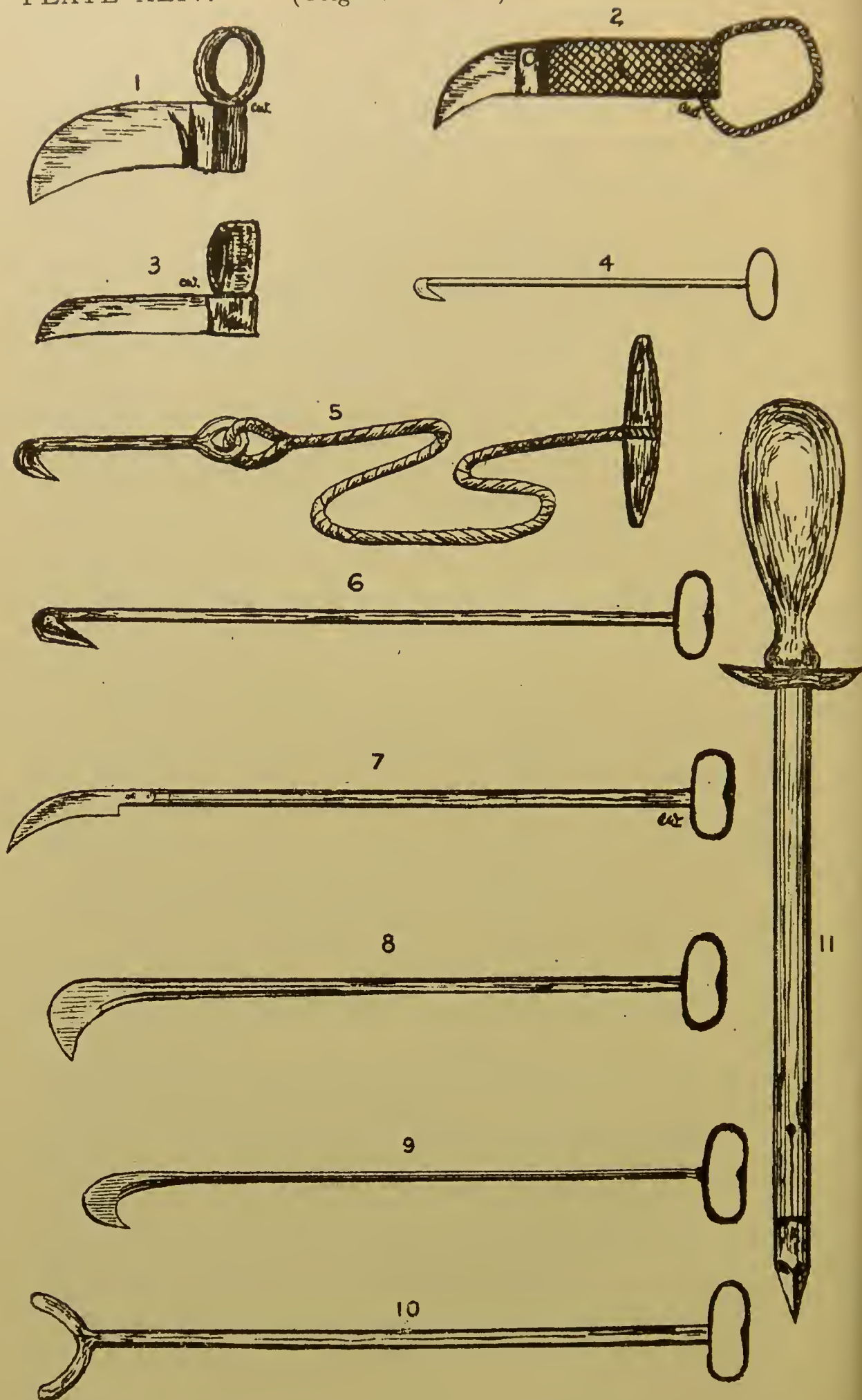


PLATE XLIV. (Original—WARD.)

PARTURITION INSTRUMENTS.

1. Finger Knife.
2. Hand Knife, with cord for wrist (favourite instrument, also used for Post-pharyngeal Abscesses).
3. Finger Knife.
4. Sharp Hook, for Pigs and Lambs. Length 15 inches.
5. Short Hook, with cord, for Foal and Calf. Length of Hook, $3\frac{1}{2}$ inches;
Cord, 4 feet 6 inches.
6. Long Hook. 2 feet 6 inches; $\frac{1}{2}$ inch diameter.
7. Long Knife. Do. do.
8. Long Large Hook Knife. 2 feet 6 inches; $\frac{1}{3}$ inch diameter.
9. Long Small Hook Knife. Do. $\frac{1}{4}$ do.
10. Crutch. Length, 2 feet 6 inches; $\frac{1}{2}$ inch diameter.
11. Trocar and Canula, used in Imperforate Hymen (*See Page 255, and Plate 35*)



put across the vulva, or a truss may be put on to prevent recurrence. Should the animal strain and press a great deal after the operation, the best sedative is to drive it into a pond, letting it stand up to the knees for fifteen or twenty minutes, and allowing it to drink the water, if so inclined.

In some cases the womb is torn to such a degree that it has to be cut off—a formidable operation, yet successful cases are recorded.

Eversion of the Bladder also occasionally happens. It is easily known by its bluish-green colour, and the constant dribbling of water down the thighs, and a portion of the bladder is seen hanging outside. On careful examination of the parts, the *meatus urinarius* (neck of the bladder) is found. By gentle pressure it can be readily returned, but is very difficult to keep in its place, though on driving the animal about, and dashing a few quarts of cold water against the vulva, it will retain its position.

Rupture of the Bladder I have met with, where the mare has begun foaling during the night without assistance.

Pelvic Hæmatomata, or Blood Tumours, are found in the pelvic cavity of the cow and sow; they are generally caused by injuries to the parts in cases of difficult parturition.

SYMPTOMS.—A few weeks after calving, the animal commences to strain as if in labour, and urine dribbles from the vulva. The patient has a very irregular appetite, and loses its belly. On examination of the parts, made by introducing the hand into the rectum, a doughy swelling is felt, either at the bottom of the bowel, or on the sides.

TREATMENT.—The clotted blood must be removed by cutting into the tumour through the side of the vagina; afterwards dressing the parts with antiseptics and tow.

Mammitis, or **Inflammation of the Mammary Glands or Udder** (sometimes called Garget).—All animals of the female sex are subject to this complaint.

Mare.—It is occasionally seen in the mare, involving one or both sides of the udder ; it may appear a week or two before foaling, but more often happens afterwards, especially if the mare is in good condition and has lost its foal. Sometimes it occurs when the animal is not pregnant, usually in animals with gummy legs that are predisposed to weed or grease.

It may also arise from a bad wound in the leg or foot, the irritation from which extends up the inside of the hind-leg, thus implicating the udder. It causes a great amount of constitutional fever, the udder being hard and painful, while the patient walks with a stiff straddling gait.

TREATMENT.—If the fever be very high, the head hanging, with quick breathing, and dilated nostrils, great relief results from bleeding to the extent of from four to six quarts, following this by giving twenty to thirty ounces of linseed oil, and from one to two ounces of spirits of nitre, with a tablespoonful of saltpetre in the drinking water ; the udder should be fomented with hot water three or four times every twenty-four hours, and the teats drawn at the same time, after which dry well with a soft cloth, and apply a little carbolic oil. Sometimes the udder gathers and bursts in several places ; the case then becomes troublesome. When this happens, the foal (if there is one) should be taken from the mother and brought up by hand.

Cow.—Inflammation of the udder is very common in the cow, when one or more of the quarters may be involved. It is said by many writers to be mostly seen after calving, and to be due to overstocking. This, however, has not been my experience ; cases arising from these causes being rare in my practice.

There are many causes of mammitis, such as derangement of the digestive system, sore warty teats, vesicular eruptions, as from foot and mouth disease, &c., kicks and injuries to the udder, irregular milking, stricture and obstruction of the teats, and the too frequent and injudicious introduction of the teat syphon.

The greatest number of cases are, however, seen amongst grazing cattle in extremely hot, dry weather, when the animals gallop about

the fields and then plunge into a pond or river, standing there for hours up to the belly in cold water ; or, when a few intensely hot days are followed by a heavy splash of rain. These latter causes seem to make the malady spread like an epidemic ; I have seen as many as from twelve to fifteen cases in one day.

Cows that are supposed to have been stripped dry of milk, and put out to graze, suffer most from this form of the malady. The affection is fully established, before being noticed, then, on examination, and drawing of the teats, the gland is found full of curdled matter.

TREATMENT.—For this class of cases splitting the teat with a bistoury, or cutting it off, half-way up, gives the quickest relief, and forms the best exit for the pus. The latter operation may seem cruel, but it is more cruel to leave the matter pent up in the gland, and to irritate the parts by squeezing it out of the teat four or five times a day. The teat is of little consequence when the animal is being prepared for the fat market. Rub the udder night and morning with carbolic oil, and if there is a great deal of fever and general disturbance, the animal must be treated with cooling medicines, such as 4 ounces Epsom salts, $\frac{1}{2}$ ounce saltpetre, and a few ounces of aromatic cordials, as ginger, gentian, aniseed, &c., which may be given night and morning, in treacle gruel, until the bowels respond.

When the **dairy cow** is affected, one or more of the quarters may be attacked, either before or after calving ; the udder becomes hard and painful, and the teats pointed, which, on being pressed, yield a quantity of curdled milk and watery fluid.

If the inflammation is not arrested in this stage, the complaint may go on until matter is formed, or abscesses form and burst in various parts of the udder, giving rise to great trouble. Again the gland may become hard and indurated, or even gangrenous.

There is no complaint that will, in such a short time, produce so much constitutional disturbance and high fever, and cause the animal to lose flesh so fast, as an acute attack of inflammation of the udder. The disease is occasionally accompanied with stiffness or lameness of the hind-legs.

TREATMENT.—When first observed, and before matter is formed, the affected quarters must be fomented with hot water for from forty or sixty minutes, four times in the twenty-four hours. Immediately after the hot fomentations, the parts must be washed well with cold water for five minutes and then rubbed perfectly dry with a soft cloth, after which apply equal parts of carbolic oil and liquid extract of belladonna; cover up with cotton wool and support with a bandage round the loins and over the quarters. To be successful in preventing the formation of pus, energy, perseverance, and patience are required; if, however, matter should form, it must be liberated as already shown. Constitutional disturbances are to be treated with the fever medicines as recommended for the grazing cow (*see page 271*).

Induration.—When the udder becomes hard, applications of 20 per cent. oleate of mercury, or iodine mercurial ointment must be rubbed well into the parts every third day, and preparations of iodine administered internally daily.

If **gangrene** or **mortification** sets in, the case usually runs its course in a few days, the udder becomes a dark purple colour, and the animal dies of blood poisoning, or the glands may slough and drop off, as named on page 273.

Blind Teats.—Numerous cases are met with where the animal has milked all right, and been perfectly correct up to the time of drying, prior to having its next calf; but after calving, one or more of the teats are found “blind,” and on examination, a small hard knot is felt at the end, or in the middle of the passage of the teat. The milk may be liberated with a syphon, but owing to the instrument having to be introduced night and morning, local inflammation is generally set up and the quarter lost.

Such cases cause a deal of unpleasantness and litigation, when the animals have changed owners between the time of drying and calving. The cause seems to be, that a portion of milk has been secreted after the last milking, the watery portions of which have become absorbed, leaving a small piece of curded milk in the teat, which becomes organized into a small knot, thus blocking up the passage.

Paralysis of the milk secreting cells.—I have known cases where a heavy milker, that has been noted for its large milk and butter giving qualities, prepares for calving, the udder becoming congested and much enlarged, yet after calving, there was an entire absence of milk in the gland. Sales of animals so affected often cause unpleasantness between buyer and seller.

Relaxed Teats.—Occasionally the teats lose tone, and become unable to retain the milk, which runs off immediately it is secreted.

The best treatment for this is to paint the ends of the teats after each milking with *flexible collodion*, or to apply a suitable india-rubber ring.

Sheep.—The ewe, particularly in frosty weather, suffers very much from inflammation of the udder, and more so, when the teats are chapped and sore. The udder is much swollen and painful to the touch, and on pressing the teat a quantity of straw-coloured watery fluid escapes.

TREATMENT.—Good nursing, drawing the teats, and rubbing the affected parts with the carbolic oil is recommended. Hot fomentations, if the parts are not thoroughly dried with a soft cloth when finished, only aggravate the complaint.

If the case runs on to gangrene, the udder becomes, first red in colour, next purple, and finally black; and to guard against this, a careful examination should be made twice daily. The lambs must be taken off, the ewe isolated, and carbolic oil, or Stockholm tar smeared over the gland, the latter being preferable; leave the animal alone, and it is astonishing to see how soon nature can assert her influence, the physiological action of the healthy parts throwing off the diseased portions; in the space of a few weeks, the remains of the gland hang from the belly in the form of long fingers of flesh, which can be removed by the clam and hot iron, the ecraseur, or ligature.







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18 KING STREET, WHITEHAVEN.





